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'*Knowledge is proud that he has learned so much,*
Wisdom is humble that he knows no more.'—COWPER.

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Animal Physiology.

BY ARTHUR NEWSHOLME, M.D., AND C.S.S. (LOND.)

FUNCTIONS OF THE SKIN.

THE skin serves (1) as a general covering and protection to the body. (2) It is the great peripheral organ of common sensation. (3) In virtue of its involuntary muscular fibres, it possesses a certain amount of vital contractility. (4) At times it may serve to absorb various gaseous or liquid bodies. The amount of liquid which may be absorbed by the skin is somewhat difficult to ascertain, as a constant loss from the skin is also occurring. Under certain circumstances, however, the body does increase in weight after immersion in a bath. Similarly, by energetic rubbing, mercurial ointment may be absorbed into the circulation from the skin, and its constitutional effects produced.

In the frog, life may be sustained for some time after the lungs have been removed, carbonic acid being eliminated, and oxygen absorbed by the cutaneous surface. In man, owing to the greater thickness of the epidermis, this cutaneous respiration is much more limited, the amount of carbonic acid eliminated by an average man having been calculated at from 4 to 10 grammes per diem.

(5) It is an excretory organ, by means of its sebaceous and sudoriparous glands. The oily matter formed by the sebaceous glands serves chiefly to keep the skin soft and supple.

The perspiration poured out by the sudoriparous glands is a more active excretion. It is constantly occurring to an imperceptible or *insensible* extent; but when excessive in amount it becomes visible, and is then known as *sensible* perspiration.

The amount probably averages from two to three pints in the 24 hours, though under the influence of severe exertion, and in hot weather it may be greatly increased. Thus, according to Maclaren, an hour's energetic fencing is followed by an average loss of weight of three pounds.

Perspiration is increased in dry conditions of the atmosphere, or when large quantities of fluid have been ingested, or when the kidneys are comparatively inactive. Its formation is largely under the influence of mental conditions, and is increased or diminished in various diseases, or from the action of certain drugs. When the sympathetic nerve is divided, excessive perspiration results.

The fluid perspiration, or sweat, has a characteristic odour, and is generally acid in reaction. It contains about 1·8 per cent. of solids, two-thirds of which is organic matter. The inorganic matter is chiefly chloride of sodium; the organic consists of various fatty acids, a little fat, and some urea. The quantity of urea is not great, but it is increased when there is deficient elimination by the kidneys.

When the skin of an animal is coated over with some impermeable varnish like gelatine, death shortly follows, preceded by a lowered temperature and symptoms like those of poisoning. The fatal result may be due to the increased loss of heat from the glazed skin, but probably is aided by the retention of excretory matters in the circulation.

(6) The skin is an important regulator of the animal temperature, owing to the varying exposure of blood in its vessels, and the varying amount of perspiration.

The average temperature of the surface of the body in man is 98·4° to 98·6° Fahr. The maintenance of a moderately uniform temperature is an essential condition of health.

The heat maintaining this temperature is produced by the chemical changes occurring in every part of the body. Each organ and tissue receives oxygen from the arterial blood, and gives up carbonic acid to the venous blood; and this change is only one among many chemical changes. Blood is warmer in the veins than in the arteries. The blood leaving the liver is warmer than that of any other part of the body; while there is no positive evidence of any change of temperature of the blood in passing through the lungs. The lungs are not, as formerly supposed, the furnace of the human system, but only the bellows supplying the whole system (the furnace) with air.

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The heat of the body being formed in the various organs of the body in proportion to their functional activity, is distributed uniformly by means of the circulating blood.

Heat is lost—(*a*) by the skin; (*b*) in respiration, air having been heated during its stay in the lungs; (*c*) with the food and drink taken, if below the temperature of the body; (*d*) with the excreta; and (*e*) by the transformation of heat into mechanical motion. Probably 80 to 90 per cent. of the whole loss by these different channels is through the skin.

The loss of heat by the skin occurs in three different ways. (1) By *conduction*, when the skin is in contact with anything colder than itself; (2) by *radiation* into space; and (3) by *evaporation* of the perspiration. The last cause produces considerable loss of heat, even when the perspiration is not so abundant as to be visible. In very cold weather the amount of conduction and radiation would be increased, while the evaporation would be diminished, thus counterbalancing to some extent the increased loss in the other respects. The best clothing is that which is made of the worst conducting material, while at the same time it does not interfere with perspiration.

The blood-vessels of the skin contract or dilate according as they are subjected to the influence of cold or heat. Under the influence of cold the blood is driven into internal organs, especially the abdominal, and thus the general temperature is maintained. During active exercise, a large amount of heat is produced, but the temperature of the body scarcely rises, owing to the fact that respiration is hastened, and the cutaneous blood-vessels are dilated, thus causing a regulative cooling of the body.

(To be continued.)

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Easy Steps in Trigonometry.

BY REV. A. D. CAPEL, M.A.,

Author of 'Catch Questions in Arithmetic,' etc., etc.

ANSWERS AND HINTS TO SOLUTIONS.

CHAPTER XV.

1. The angle at the centre of a circle which is subtended by an arc equal to the radius.

To find the number of degrees in it we have this proportion

$$\pi : 1 = 180^\circ : x^\circ$$

$$\therefore x^\circ = \frac{180^\circ}{\pi}$$

If we consider $\pi = 3\frac{1}{7}$ we only get the value correct to one place of decimals. If we consider $\pi = 3{\cdot}1416$ we get it correct to three places of decimals.

By taking a nearer convergent to the value of π, we find the value of the unit of C. M. 57·29577...° which is sufficiently correct for most problems.

2. $\pi : 2{\cdot}5 = 180^\circ : x^\circ$

$$\therefore x^\circ = \frac{25 \times 18}{\pi}.$$

3. $180 : 25 = \pi : x$

$$x = \frac{5\pi}{36}.$$

4. Let x be the number. Reducing all to C.M. we have

$$\frac{\pi \cdot x}{180} + \frac{\pi \cdot x}{200} + x = \pi$$

$$\text{whence } x = \frac{1800\pi}{19\pi + 1800}.$$

5. Let θ = C.M. of third

$$\frac{\pi^2}{180} + \frac{\pi^2}{200} + \theta = \pi$$

$$\therefore \theta = \frac{1800\pi - 19\pi^2}{1800}.$$

6. Let θ = C.M. of 25°

$$\therefore \theta = \frac{25 \cdot \pi}{180} \text{ or } \frac{5 \cdot \pi}{36}$$

$$\text{but } \theta = \frac{\text{arc}}{\text{rad.}}$$

$$\therefore \text{arc} = \frac{5 \cdot \pi}{36} \cdot \tfrac{1}{4} \text{ ft.} = \frac{25\pi}{72} \text{ ft.}$$

7. Let x° = number of degrees in the angle,
$90^\circ - x$ = number of degrees in the complement
and $\frac{1}{9}^\circ\ (90 - x)^\circ$ = number of grades in the complement
but $10\ (90 - x) = 9x$

$$\therefore x = \tfrac{900}{19}$$

$$\text{and its C.M.} = \tfrac{900}{19} \cdot \frac{\pi}{180} = \frac{5\pi}{19}.$$

8. $1 : 5{\cdot}09296 = 11{\cdot}25^\circ : x$

$$\therefore x = 57{\cdot}2958^\circ.$$

9. Since circ. $= 2\pi$ radius

$$\therefore \text{radius} = \frac{n}{2\pi}.$$

10. Let the larger wheel pass through 1°, then the smaller wheel passes through $\frac{180^\circ}{\pi}$ ∴ their circumferences are as $180^\circ : \pi$ and ∴ their radii are also as $180^\circ : \pi$. Ans.

11. If the student draw a figure he will see that the radius of the circular section parallel to that bounded by the equator, through the 60th degree of N. or S. latitude is $\frac{1}{2}$ (*i.e.* cos 60°) the radius of the equator or earth; the circumference of this smaller circle is $\pi \cdot 4000$ miles, and $\frac{1}{7}\frac{1}{0}$ of this, or 34·9206 miles, is the length of a degree of longitude at lat. 60° N. or S.

12. Conversely if x = degree of latitude, we have

$$\pi \times 8000 : 360 \times 49{\cdot}38523... = 1 : \cos x^\circ$$

$$\therefore \cos x^\circ = {\cdot}707106 = \frac{1}{\sqrt{2}} \quad \therefore x = 45^\circ.$$

13. $\frac{94{,}000{,}000 \times 2 \times \pi}{365 \times 24 \times 60 \times 60}$ or $\frac{11750}{1971}\pi$ miles a second.

14. Ans. 3π feet.

15. Since $\tan\frac{\theta}{2}, \frac{\theta}{2}, \sin\frac{\theta}{2}$ are in descending order of magnitude

$$\tan\frac{\theta}{2} > \frac{\theta}{2}$$

$$\times \cos\frac{\theta}{2}; \quad \therefore \tan\frac{\theta}{2} \cdot \cos\frac{\theta}{2} > \frac{\theta}{2} \cdot \cos\frac{\theta}{2}$$

$$\therefore \sin\frac{\theta}{2} > \frac{\theta}{2} \cdot \cos\frac{\theta}{2}$$

$$\times 2\cos\frac{\theta}{2} \quad \therefore 2\sin\frac{\theta}{2} \cdot \cos\frac{\theta}{2} > 2 \cdot \frac{\theta}{2} \cdot \cos^2\frac{\theta}{2}$$

$$\therefore \sin\theta > \theta\left(1 - \sin^2\frac{\theta}{2}\right)$$

$$\therefore \sin\theta > \theta - \theta\sin^2\frac{\theta}{2}$$

$$\text{but } \sin^2\frac{\theta}{2} < \frac{\theta^2}{4}$$

$$\therefore \sin\theta > \theta - \frac{\theta^3}{4}$$

$$\text{but } \sin\theta < \theta \quad \therefore \text{ &c.}$$

16. Let x = distance or radius of the circle

$$30^{\circ} = \frac{\pi}{180.\ 60.\ 2}$$

$$\therefore \frac{6}{x} = \frac{\pi}{180.\ 60.\ 2} \quad \therefore x = \frac{6.\ 180.\ 60.\ 2}{\pi} \text{ ft.}$$

or (letting $\pi = \frac{22}{7}$) $7\frac{7}{11}$ miles.

17. Ans. New Circ. Meas. $= \frac{\text{arc}}{\text{radius}} \times \frac{5}{\pi}$

18. The unit of measure is $\frac{1}{2}°$ and of these there are 360 in two right angles.

$$\therefore \pi : 4{\cdot}716 = 360 : \text{Ans.}$$

$$\text{or Ans. } \frac{4{\cdot}716 \times 360}{\pi}.$$

19. Since the angle is very small we may consider the 51 feet as the measure of the arc. Let x feet = distance

$$\therefore \frac{51}{x} = \frac{\pi}{11.\ 180} \text{ or } x = \frac{51.\ 11.\ 180}{\pi}$$

20. Let x miles = distance

$$\therefore x^2 = \tfrac{3}{4}.\ 5 \times 1760 \times 3$$
$$= 3^2.\ 5^3.\ 4^2.\ 11$$
$$\therefore x = 60\sqrt{11} \text{ miles.}$$

21. Divide the circumference of the circle into a large number (n) of equal arcs, and join each division with the next, and the centre with each division. We have then n isosceles triangles and the sum of these triangles by making n very large can be made as nearly equal to the circle as we like and their altitude as nearly equal to the radius as we please.

The sum of the bases of all the triangles is = the circumference, hence the area $= \frac{1}{2}$. rad. $\times$ circ.

$$= \tfrac{1}{2}.\ \text{rad.} \times 2.\ \text{rad.} \times \pi$$
$$= \pi\ (\text{radius})^2.$$

22. Since $\pi r^2 = 3$

$$\therefore r = \sqrt{\frac{3}{\pi}}$$

$$\therefore \text{C.M. of angle} = \frac{1}{\sqrt{\frac{3}{\pi}}} \text{ or } \sqrt{\frac{\pi}{3}}$$

23, 24. These formulæ are wrongly printed in the last number as will be seen below

By Form. 1 $\sin^2 a + \cos^2 a = 1$ ..... i.

,, Form. 6 $2 \sin a \cos a = \sin 2a$ ..... ii.

adding i. and ii. and extracting square root of either side

$$\sin a + \cos a = \pm\sqrt{1 + \sin 2a} \quad \text{.....iii.}$$

subtracting ii. from i. and extracting the square root of either side

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Adding iii. and iv. $2 \sin a = \pm\sqrt{1 + \sin 2a} + (\pm\sqrt{1 - \sin 2a})$

Subtracting iv. from iii. $2 \cos a = \pm\sqrt{1 + \sin 2a} - (\pm\sqrt{1 - \sin 2a})$

On which of the signs to be taken, according to the value of the angles, we will discuss in the next chapter.

25. $\tan x = \dfrac{\sin x}{\cos x} = \dfrac{x - \frac{x^3}{1.2.3} + \frac{x^5}{1.2.3.4.5} - \ldots}{1 - \frac{x^2}{1.2} + \frac{x^4}{1.2.3.4} - \ldots}$

let this fraction $= x + bx^2 + cx^3 + dx^4 + ex^5 + \ldots$

multiplying out we have

$$x - \frac{x^3}{1.2.3} + \frac{x^5}{1.2.3.4.5} - \ldots = x - \frac{x^3}{1.2} + \frac{x^5}{1.2.3.4}$$
$$+ bx^2 - \frac{bx^4}{1.2}$$
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equating coefficients of like power of x

$$b = 0,\ d = 0,$$

$$-\frac{1 - 2c}{1.2} = -\frac{1}{1.2.3} \quad \therefore c = \tfrac{1}{3} \text{ or } \frac{2}{1.2.3}$$

$$\frac{1 - 12c + 24e}{1.2.3.4} = \frac{1}{1.2.3.4.5} \quad \therefore 5 - 20 + 120e = 1$$

$$\text{or } e = \frac{16}{5 \times 24} \text{ or } \frac{2^4}{1.2.3.4.5}$$

$$\therefore \tan x = x + \frac{2}{1.2.3}x^3 + \frac{2^4}{1.2.3.4.5}x^5 + \ldots$$

CHAPTER XVI.

RATIOS OF SUBMULTIPLES OF ANGLES.

226. If we know the ratios of an angle, we can find from them the ratios of its half, fourth, eight, &c., and, if we can solve cubic equations, we can find its third, ninth, &c., and by combining the two operations we can find its sixth, twelfth, &c.

227. In the last chapter we gave as examples to prove.

$$2 \sin A = \pm\sqrt{1 + \sin 2A} \pm \sqrt{1 - \sin 2A}$$
$$2 \cos A = \pm\sqrt{1 + \sin 2A} \mp \sqrt{1 - \sin 2A}$$

properly these formulæ ought to be written.

$$2 \sin A = \pm\sqrt{1 + \sin 2A} + (\pm\sqrt{1 - \sin 2A}) \quad \text{Form. 41}$$

$$\text{and } 2 \cos A = \pm\sqrt{1 + \sin 2A} - (\pm\sqrt{1 - \sin 2A}) \quad \text{Form. 42}$$

We cannot, however, prefix the proper signs until we know in which quadrant, as described in 228, the angle A is.

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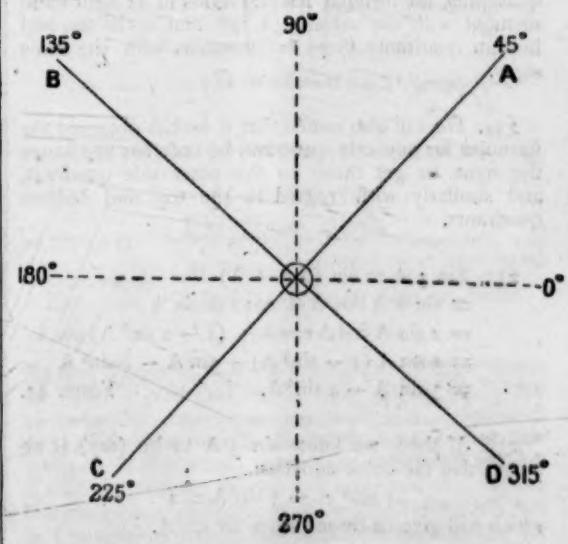

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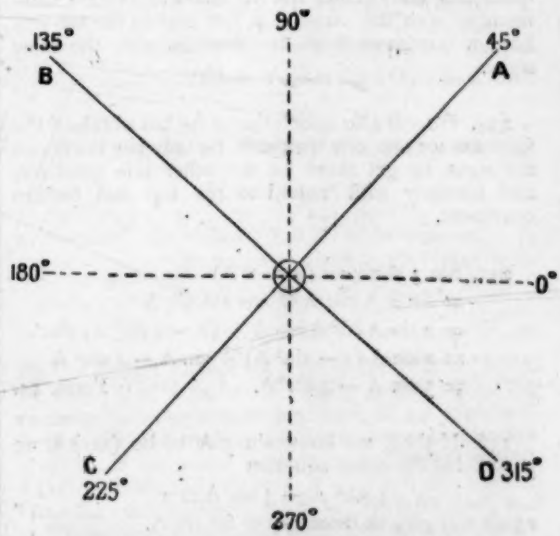


We have here drawn thick lines from A to C, and B to D, because the signs of the terms in the formulas in 227 depend upon which of the four quadrants AOD, AOB, BOC, or COD, the angle A is situate.

229. First to prove the formulas of 227.

$$\text{Sin}^2 A + \cos^2 A = 1 \qquad \text{Form. 1.}$$

$$2 \sin A \cos A = \sin 2A \qquad \text{Form. 6.}$$

Adding and extracting the square root

$$\sin A + \cos A = \pm\sqrt{1 + \sin 2A}$$

subtracting and extracting the square root

$$\sin A - \cos A = \pm\sqrt{1 - \sin 2A}$$

In the quadrant AOD, the cosine is both plus and greater than the sine, ∴ in this quadrant

$$\text{Sin } A + \cos A = +\sqrt{1 + \sin 2A}$$

$$\text{and } \sin A - \cos A = -\sqrt{1 - \sin 2A}.$$

e.g. $2 \sin 40^\circ = \sqrt{1 + \sin 80^\circ} - \sqrt{1 - \sin 80^\circ}$

and $2 \cos 40^\circ = \sqrt{1 + \sin 80^\circ} + \sqrt{1 - \sin 80^\circ}$

230. In the quadrant AOB, the sine is both plus and greater than the cosine.

e.g. $2 \sin 80^\circ = \sqrt{1 + \sin 160^\circ} + \sqrt{1 - \sin 160^\circ}$

$2 \cos 80^\circ = \sqrt{1 + \sin 160^\circ} - \sqrt{1 - \sin 160^\circ}$

231. In the quadrant BOC, the cosine is minus and numerically greater than the sine.

e.g. $\text{Sin } 140^\circ + \cos 140^\circ = -\sqrt{1 + \sin 280^\circ}$

$\sin 140^\circ - \cos 140^\circ = +\sqrt{1 - \sin 280^\circ}$.

∴ $2 \text{ Sin } 140^\circ = -\sqrt{1 + \sin 280^\circ} + \sqrt{1 - \sin 280^\circ}$

$2 \cos 140^\circ = -\sqrt{1 + \sin 280^\circ} - \sqrt{1 - \sin 280^\circ}$

232. Lastly in the quadrant COD, the sine is minus and numerically greater than the cosine.

e.g. $2 \sin 230^\circ = -\sqrt{1 + \sin 460^\circ} - \sqrt{1 - \sin 460^\circ}$

$2 \cos 230^\circ = -\sqrt{1 + \sin 460^\circ} + \sqrt{1 - \sin 460^\circ}$

233. The student will notice that in the side quadrants, no formula has the terms in its right hand member with the same sign, but that in the top and bottom quadrants there are formulas with the same signs.

234. He will also notice that if he has obtained the formulas for one side quadrant, he only has to change the signs to get those for the other side quadrant, and similarly with regard to the top and bottom quadrants.

235. $\text{Sin } 3A = \sin (2A + A)$

$= \sin 2A \cos A + \cos 2A \sin A$

$= 2 \sin A \cos A \cos A + (1 - 2 \sin^2 A) \sin A$

$= 2 \sin A (1 - \sin^2 A) + \sin A - 2 \sin^3 A$

$= 3 \sin A - 4 \sin^3 A.$ Form. 43.

236. If then, we know sin 3 A to be (say) a, we must solve the cubic equation

$$4 \sin^3 A - 3 \sin A = a$$

which will give us three values for sin A.

237. The student is sometimes asked to explain the meaning of the double sign in

$$\cos A = \pm\sqrt{1 - \sin^2 A}.$$

If we know simply the value of sin A as being $\pm x$.

There are values of A in two quadrants (not the quadrants of 228, but the quadrants between 0° and 90°, 90° and 180°, &c.) which will satisfy the equation $\sin A = x$, but the cosines in these quadrants are of different signs. *e.g.* $\text{Sin } 30^\circ = \sin 150^\circ = x$

$$\cos 30^\circ = +\sqrt{1 - x^2}$$

$$\text{but } \cos 150^\circ = -\sqrt{1 - x^2}$$

$$\text{similarly } \cos 10 = \cos 150 = x$$

$$\text{Sin } 10 = +\sqrt{1 - x^2}$$

$$\text{but } \sin 350^\circ = -\sqrt{1 - x^2}$$

238. Again we know from Form. 9

$$\cos \frac{x}{2} = \pm\sqrt{\frac{1 + \cos x}{2}}$$

If we know cos x° there are two quadrants in which x° may be. But the half of one of these angles will fall in one quadrant, and the half of the other of them will fall in another quadrant in which the cosine is not of the same sign. *e.g.* Let $\cos 40^\circ = x$.

$$\cos (360^\circ - 40^\circ) \text{ or } \cos 320^\circ = x.$$

$\text{Cos } \frac{40}{2}$ or $\cos 20 = +\sqrt{\frac{1 + x}{2}}$ being in the first quadrant, but $\cos \frac{320}{2}$ or $\cos 160^\circ = -\sqrt{\frac{1 + x}{2}}$ being in the second quadrant.

239. EXAMINATION AND EXAMPLES, XVI.

1. Express sin 15° in terms of sin 30°.
2. ,, cos 70° ,, ,, sin 140°.
3. ,, cos 235° ,, ,, sin 470°.
4. ,, sin 133° 30′ ,, ,, sin 267°.
5. ,, cos 212° 15′ ,, ,, sin 424° 30′.
6. ,, cos 310° ,, ,, sin 260°.
7. ,, sin (− 4)° ,, ,, sin (− 8)°.
8. ,, cos (− 130)° ,, ,, sin (− 260)°.
9. ,, cos 130° ,, ,, sin 260°.
10. ,, sin 10° ,, ,, sin 40°.
11. ,, cos 9° ,, ,, sin 36°.
12. ,, cos 2° ,, ,, sin 16°.
13. Sin 390° = ½, find cos 195°.
14. Sin 90° = 1, find sin 22½.
15. Prove $\cos 3A = 4 \cos^3 A - 3 \cos A$ and call it Form. 44.
16. From cos 90° = 0, find from Form. 44, cos 30°.
17. Express cos 30 in terms of cos 60°.
18. ,, sin 210 ,, ,, cos 60°.
19. ,, sin 50 ,, ,, cos 260°.
20. ,, cos 40 ,, ,, cos 280°.
21. Since sin (2 × 18°) = cos (3 × 18°). Find cos 18°.
22. Find sin 9°.
23. Find cos. 4° 30′.
24. Find sin 7° 30′.
25. Find sin 12°.

CHAPTER XVII.

INVERSE NOTATION.

240. The student knows that the expression $\sin^{-1}\frac{1}{2}$ means the angle whose sine is $\frac{1}{2}$.

Draw a right angled triangle, whose perpendicular $= 1$, hypotenuse $= 2$, and whose base is $\therefore = \sqrt{3}$.

If $\therefore \sin x = \frac{1}{2}$, $\cos x = \frac{\sqrt{3}}{2}$, $\tan x = \frac{1}{\sqrt{3}}$, &c.

$$\therefore \sin^{-1}\tfrac{1}{2} = \cos^{-1}\frac{\sqrt{3}}{2} = \tan^{-1}\frac{1}{\sqrt{3}}$$

241. Problems in inverse notation are generally worked by substituting some symbol of the angle, and then reducing back again to the inverse notation, *e.g.*

Prove $2\tan^{-1}a = \tan^{-1}\frac{2a}{1-a^2}$

let $\tan^{-1}a = x$

$\therefore \tan x = a$

$$\tan 2x = \frac{2\tan x}{1-\tan^2 x} = \frac{2a}{1-a^2}$$

$$\therefore 2x = \tan^{-1}\frac{2a}{1-a^2}$$

but $x = \tan^{-1}a$

$$\therefore 2\tan^{-1}a = \tan^{-1}\frac{2a}{1-a^2}$$

242. I think the student ought to work these problems without any substitution whatever, thus :—

$$\tan(2\tan^{-1}a) = \frac{2a}{1-a^2}$$

$$\therefore 2\tan^{-1}a = \tan^{-1}\frac{2a}{1-a^2}$$

243. To work one more example.

Prove $\sin^{-1}a + \sin^{-1}b =$

$$\sin^{-1}\{a\sqrt{1-b^2} + b\sqrt{1-a^2}\}$$

Remembering that $\sin^{-1}a = \cos^{-1}\sqrt{1-a^2}$ &c.

$$\sin(\sin^{-1}a + \sin^{-1}b) = a\sqrt{1-b^2} + b\sqrt{1-a^2}$$

$$\therefore \sin^{-1}a + \sin^{-1}b = \sin^{-1}(a\sqrt{1-b^2} + b\sqrt{1-a^2}$$

244. To prove that $\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{3} = 45^\circ$ or $\frac{\pi}{4}$

$$\tan(\tan^{-1}\tfrac{1}{2} + \tan^{-1}\tfrac{1}{3}) = \frac{\frac{1}{2}+\frac{1}{3}}{1-\frac{1}{2}\times\frac{1}{3}} = 1$$

$$\therefore \tan^{-1}\tfrac{1}{2} + \tan^{-1}\tfrac{1}{3} = \tan^{-1}1 = 45^\circ \text{ or } \frac{\pi}{4}$$

245. EXAMINATION AND EXAMPLES, XVII.

1. Find $\tan\sin^{-1}a$.
2. ,, $\cos\sec^{-1}b$.
3. ,, $\sin\cos^{-1}c$.
4. Find $\sin\cos^{-1}\frac{1}{2}$.
5. ,, $\sin(\sin^{-1}a + \cos^{-1}b)$.
6. ,, $\tan(\tan^{-1}a + \tan^{-1}b)$.
7. ,, $\tan\left(\sin^{-1}\frac{a}{\sqrt{1-a^2}} + \tan^{-1}b\right)$
8. ,, $\cos(\sin^{-1}a + \tan^{-1}a)$.
9. ,, $\sin(\sin^{-1}\frac{1}{2} + \cos^{-1}\frac{1}{3})$.
10. ,, $\sec\sin^{-1}\tan\cos^{-1}\frac{1}{\sqrt{1+a^2}}$.
11. Prove $\operatorname{cosec}^{-1}\sqrt{50} + \operatorname{cosec}^{-1}\sqrt{65} = \sin^{-1}\frac{3}{\sqrt{130}}$.
12. ,, $\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{5} = \tan^{-1}\frac{4}{7}$.
13. ,, $\tan^{-1}\frac{1}{4} + \tan^{-1}\frac{1}{5} = \tan^{-1}\frac{7}{9}$.
14. ,, $\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{2} = 45^\circ$.
15. ,, $\tan^{-1}\frac{1}{4} + \tan^{-1}\frac{1}{5} + \tan^{-1}\frac{1}{7} + \tan^{-1}\frac{1}{8} = 45^\circ$.
16. By a similar method to that adopted in 12, 13, 14, and 15. Prove $\cos^{-1}\frac{3}{4} + \cos^{-1}\frac{5}{13} + \cos^{-1}\frac{1}{8} = \pi$.
17. Prove $\cot^{-1}\frac{1}{2} + \cot^{-1}\frac{1}{3} - \cot^{-1}\frac{1}{2+\sqrt{3}} = \frac{\pi}{3}$.
18. ,, $2\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{7} = \frac{\pi}{4}$.
19. ,, $2\tan^{-1}\frac{1}{8} + \tan^{-1}\frac{1}{7} + 2\tan^{-1}\frac{1}{3} = \frac{\pi}{4}$.
20. ,, $\tan^{-1}\frac{1}{99} - \tan^{-1}\frac{1}{70} + 4\tan^{-1}\frac{1}{5} = \frac{\pi}{4}$.
21. ,, $3\sin^{-1}a = \sin^{-1}(3a - 4a^3)$.
22. Show that $\sin^{-1}(\cos x) + \cos^{-1}(\sin y) + x + y = \pi$.
23. If $\tan^{-1}3x - \tan^{-1}x = \tan^{-1}\frac{1}{3}$, find x.
24. If $\sec^{-1}\frac{x}{a} - \sec^{-1}\frac{x}{b} = \sec^{-1}b - \sec^{-1}a$
Prove that $x = \pm ab$.
25. If $\tan^{-1}2x + \tan^{-1}3x = \frac{\pi}{4}$. Find x.

(To be continued.)

The Naas Slöjd.

BY MISS J. WARREN,

Inspectress of Infant Schools to the Leicester Board.

As next month will see the conclusion to these papers on Slöjd, I now preface my short article with a few remarks that may appear irrelevant if not explained. I shall for the month of April make a complete synopsis of the whole work from beginning to end. I shall tabulate the articles and tools and also requote the rules upon which the whole system is founded, and as I have every reason now to believe that the day for its introduction into our Elementary Schools in some form is not far distant, I may perhaps be forgiven for suggesting to my intelligent readers that it will be wise of them to provide themselves with the *Text book*

(to follow shortly) that will embrace these articles under the name of 'Handiwork for Schools,' for until there arises the need for such a thing no other will certainly be in print, and I have every reason to know and believe that no work of the kind exists, at least, not in so simple a form as to be suitable to follow in a course of handiwork for public schools. Works there are but they are on special trades, not on a formulated and workable basis. I hope next month to insert a chart showing the relative sizes of the models, this I have hitherto found difficult, no provincial photographer being found capable of undertaking the work.

There appears from letters I receive to be a great desire to get handiwork as a recognised part of our education in England, and my only fear is lest the Day and High Schools should make the start. I think it rests with those of us who represent the poorer classes to say that this shall not be; we should prove by our energy in first entering the field that we are not unmindful of the growing demands of our country. We have certainly hitherto been behind in education, but in this matter we can make ample reparation to our yet unborn school children by removing this blot from the escutcheon of the profession we represent. Handiwork should, for directly physical reasons, form an integral part of our school curriculum, and if so, why not start it on such a foundation as will commend itself to the good sense of everybody whose duty and privilege it is to observe it. I am so proudly confident that no wiser method than that adopted by our professedly steady, sound, reliable friends and relations, the Swedes, *has ever been mooted*, that I recommend every schoolmaster to find out its worth before he consents to turn a boy into either bootmaker, carpenter, or indeed any other artisan that could be mentioned.

The School Board I have the honor to serve, in discussing Technical Education of the future, mentioned the hope that a work-room lately built adjoining a new school might ere long reckon in the general accommodation of that school. Is not it a disgrace to us as a nation that work, *manual* work is held in such low estimation; and forgive the digression when I add that I hope the time may come, and soon, when a factory girl shall have no power to say as one said to me the other day 'Ah, Miss Warren you would not like to work *with your hands* in a factory.' Has not the child's education and former bringing up taught her that in point of fact we despise the '*handiwork*' that is an honor and a glory to our nation. Will my readers understand the superior relation I stood in with this girl when I was able to reply 'No indeed, Nell, I too can use my hands, I have worked at a bench, and if ever the occasion should come up I shall stand side by side with the factory girls and learn of them even more; for God who gave us one head, gave us at the same time two hands for labour, which clearly proves that the work you do in the factory is every whit as good as that which I do in the schools.'

I have I trust said something in extenuation of the departure I have taken from the direct continuation of my subject. I will now proceed with a description of the *model number thirty-four*. This was a salt box, just such a thing as is used in England for salt, and *candles occasionally*; the back is slightly elevated leaving the lid lower; this is fixed and moves on pivots somewhat rude in construction, viz., nails. I referred in a much earlier number to the extreme simplicity of all our materials, to ensure the course being possible of completion by young children, in a regular school course of instruction. These nails served as hinges on which the lid worked and, if I except a certain sound not at all euphonious, I may say they answer the purpose in all particulars. The box is of pinewood, thick and strong, dovetailed, the raised portion has a hole drilled through it to hang the box up by, and indeed save for a central division, resembled in all points the strong box, *model twenty-nine*.

The sawing required for the shaping of the projecting part of the back was somewhat intricate, and so also was the driving of the nails that did duty as hinges, but the box took in all little over eight hours, the work having been so recently done in the article already referred to.

The thirty-fifth model was indeed a little more test of our patience and ingenuity, being a small covered match box, size about four inches by three, and this box led us to the conclusion that while in the earlier models, small articles were in accordance with the spirit of the scheme, and prevented the pupils tiring before they saw the fruition of their own labours, small articles might be made to serve quite another purpose, they might be put in as a requisite for that delicacy of manipulation that is often not only not found, but not really wanted in work, however useful, of a larger size. Miss Yelt, the clever Finland woman who was the schoolmistress at Nääs, and had gone through the whole course of Slöjd, and at the time of our visit taught it to her children as easily as we teach the three R's, made some of these during our stay, and even she would look admiringly at her own work when finished as a mother looks on and loves the child of many tears. The lid was fixed as that of the former model; the whole thing being an exact duplicate in miniature. The wood was the same, the tools differing very slightly, but the amount of rubbing up and refining it required can scarcely be realised on paper. I am afraid we were one and all guilty of misdemeanour with this model in surreptitiously conveying it from the *Work Room* to our private apartments to give it one or two affectionate and parting touches with shavings and silk handkerchief. A piece of sand paper glued on the bottom or inner part of the lid made it at once a most satisfactory little article to take home, and one that should certainly always keep its place in our Slöjd scheme. This 'Tändstickslåda' was made of birch wood, the thickness of its sides about one fourth of an inch.

The thirty-sixth model was another match box, but different, being yet smaller and one such as we use in our bedrooms, open at the top and called in the expressive language of Scandinavia 'Tändstickssträll,' this beautiful little thing following as it did the other was certainly well placed, our hands had been well trained for its very pure workmanship which I must enter into more fully in my next and last paper.

(To be continued.)

Notes of a Lesson on Movements of the Air.

BY JOS. H. COWHAM, F.G.S.,

Lecturer on School Method: Westminster Training College.

V.—MONSOONS.

INFORMATION ARRANGED IN TEACHING ORDER.	ILLUSTRATIONS AND TEACHING HINTS.
A. Area of the Trade Winds compared with a Monsoon Area.*	
1. The Trade Winds are well established in the Tropical Regions of the Atlantic and Pacific Oceans.	1. By reference to a map of the world lead the children to recognize the presence of **land masses** in proximity to ocean areas as the chief and distinguishing feature of Monsoon districts when compared with Trade Wind Areas.
2. They change position slightly with the motion to the northward or southward of the region of greatest heat.	2. Reproduce Fig. 1 in lesson on Trade Winds in January number of the *Practical Teacher* to show this change. The fact must be patiently and thoroughly revised, for upon it the entire theory of Monsoons is afterwards constructed.
3. The Indian Ocean, over which the Monsoons blow most regularly, is approached on its northern, its western and its eastern shores by the continental areas of Asia, S. Africa, and N. Australia respectively.	3. Teach by the help of sketch or wall map, and the contrast between the Pacific Ocean and the Indian Ocean in respect of the proximity or otherwise of land.
B. Effect of Continents upon the position of the region of greatest heat.	
1. After the Sun has passed the Vernal Equinox it shines with increasing heat upon the south of Asia, until in July the region of greatest heat is carried northwards to the Valley of the Indus and to similar latitudes in Arabia and China.	
2. After the Autumnal Equinox the Sun shines with increasing heat upon S. Africa and N. Australia, so that in January the zone of greatest heat has moved to the latitudes 10° and 15° south of the Equator.	

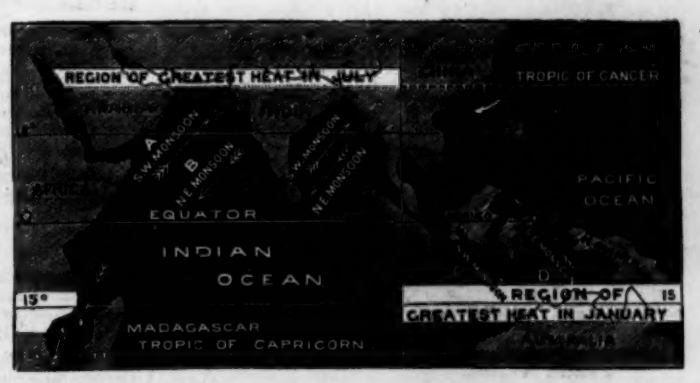


Fig. 1. Showing the regions of greatest heat during the months of July and January respectively, and the changes in the direction of the winds which follow the change of heat.

C. Effect of these changes of the region of greatest heat upon the neighbouring winds.	
1. When the greatest heat region is situated in northern India, the S.E. Trade Wind, which is nearly a constant wind 10° S. of the Equator, is carried N. of the Equator towards the heated land of S. Asia. Thus a southern direction is given to the winds which blow from April to September over India, China, and Japan.	1. It has been shown both in the lesson on Land and Sea Breezes and in that on the Trade Winds that a surface current sets in towards the district most highly heated. The white belt over southern Asia represents the region of greatest heat during the northern summer and the arrows A and D mark the directions of the monsoons at that period of the year. When however the region of intense heat is south of the Equator as shown by the white belt over Australia the monsoons take the directions marked by the arrows B and C respectively. See fig. 2 for the constant trades in the Indian Ocean.

* The Monsoon area selected is that of the Indian Ocean. The Monsoons in other tropical districts are explained, with slight local modifications, in the same way.

2. But this wind blowing as it does from the Equator towards India would be modified in direction, as it proceeds northwards, by the change in the Earth's rotatory motion.

For:—

(*a*) It would proceed from an area of greatest rotatory movement towards one of gradually lessening rotatory movement.

(*b*) The slackened rotatory movement of the Earth would not immediately be assumed by the wind, consequently.

(*c*) To an observer carried round by the rotatory movement of the Earth, a wind would appear to come from a westerly direction and to move more rapidly to the east than he himself and other objects on the Earth in the same latitude.

Thus we have a wind in southern Asia during the months between March and October, which is from the south owing to the northern position of the zone of greatest heat, and which is also westerly owing to the change in the Earth's rotatory movement in the latitudes over which it blows.

3. This wind is the S.W. Monsoon.

N.B.—The N.W. Monsoon which blows over the E. Indies and N. Australia, from October to March, is explained in the same way as the Monsoon fully explained above.

D. The N.E. Monsoon which blows over the greater portion of southern Asia, from October to March, is the ordinary N.E. Trade Wind, and should be explained in the same way as the Trade Wind.

Similarly the S.E. Monsoon which blows over N. Australia and the E. Indies, from April to September, is the ordinary S.E. Trade Wind.

DEFINITION—

The Monsoons are periodical winds which blow over Tropical Areas and are modifications of the Trade Winds. They are caused by the intense heat which accumulates over land masses during six months on the north of the Equator, and for the remaining six months, over the land masses south of the Equator.

Fig. 2. Showing the gradual change from the S.E. Trades to the S.W. Monsoon.

A. Arrows illustrating the direction of the Trades.

B. Arrows showing the Trades carried northwards over the Equator.

C. Arrows showing a gradual change of the wind from south-east, through south, to a south-westerly direction.

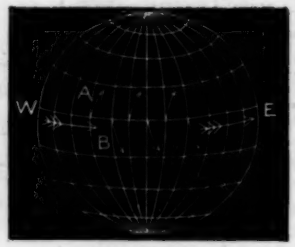


Fig. 3. Explaining the effect which the rotatory movement of the Earth has upon winds proceeding from the Equator towards the Poles.

A. The arrows indicate the direction of a wind passing northwards, but with greater rotatory movement than the Earth, and hence the wind appears a S.W. wind.

B. The arrows show the change from a N. wind to a N.W. wind, the change being entirely due to the decreasing rotatory movement of the earth's surface as the wind proceeds to higher latitudes.

3. For Illustration of the direction of N.W. monsoon see the paragraph B above.

The transference of great heat from the north to the south of the Equator restores conditions in the N. Hemisphere which were seen in our January lesson on the Trade Winds, to produce the N.E. Trades.

The application of knowledge then gained in explanation of the two remaining Monsoons, viz., the N.E. to the north and the S.E. south of the Equator, will be a useful revision of a previous lesson. At the same time it will form a most useful and natural association between the two most important Tropical Winds, viz., the Trade Winds and Monsoons.

Portions of this definition may be obtained as a result of questioning at the end of the lesson.

The answers should be shaped into a definition which may afterwards be committed to memory.

The monsoons which blow over the tropical latitudes of Africa, S. America, and the W. Indies, should be indicated on a map.

Prize Essay on the Best Method of Teaching Geography in Elementary Schools.

Awarded by the Scottish Geographical Society.

BY A. POLSON,
Public School, Dunheath, Caithness, N.B.

THE vast importance of a thorough knowledge of Geography to a nation constituted as Great Britain is, can scarcely be over-estimated. If we stay at home and would with intelligent interest follow the progress made by the world in politics, commerce, science, and missionary enterprise, as told in newspapers and magazines, it is necessary that we possess a considerable amount of geographical knowledge on which we daily require to draw. For inhabitants of Scotland this subject should possess a special charm, as so many of them have always been interested in the opening up of fields suitable for emigration.

That the subject be well taught in our elementary schools, it is necessary that our teachers should realise of how great importance towards the future well-being of the great majority of their pupils a knowledge of this subject is. When they do this they will then, in order that they may be the better able to impart the necessary knowledge, strive to make themselves thorough masters of the subject, and of the methods which are most approved by those who have been successful in teaching it.

Before definitely settling how he can bring his pupils on from stage to stage, and how at each stage he can best get the pupils to assimilate the information he places before them, the teacher should have formed—and this is a part of all good method—a distinct ideal of the amount and kind of geographical knowledge he expects his pupils to possess when leaving school. 'My Lords' of the Education Department have already in their *Minutes of Council* given teachers a high ideal towards which to work. They say 'The knowledge of geography which is best adapted to elementary schools, most likely to be understood by the children, to interest them, to remain with them, to form the subject of future reflection, become a topic of continual interest and a means of perpetuating that process of education which is but commenced in childhood, consists in the knowledge of matters concerning other parts of the world and the people who live there of like kind with those things which are familiar to the observation of the child in this part of the world. The teacher who thus makes it his aim to inform his pupils in the broad elements of physical, commercial, and, if we may call it 'moral' geography, and who looks upon the geography of names and locality as of value only in subordination to these, will confer a service upon them, whether as regards their education, their information, and the development of their human sympathies, infinitely beyond what he would do, were he to store their memories with the exact height in feet of all the mountains, and the length in miles of all the rivers, between the north pole and the south, or the exact areas of all the countries, the names of all the towns, and the numbers of the several populations between Greenwich and Greenwich again.' After having formed his ideal, which will be all the higher the better the teacher knows his subject and its importance, the successive steps by which he strives to realise that ideal, fall to be considered; and it may as well be said here that at each step the teacher should take pains to see that his teaching does not in any way clash with those recognised principles and rules of method which hold good whatever be the subject taught.

In the consideration of this subject it will conduce to clearness to consider the subject in stages under each of which fall to be stated the kind and amount of knowledge to be imparted as well as what appears to be the best method of doing so.

In the initiatory stage the child should by means of realistic teaching clearly understand the commonly used geographical terms. Towards this end a beginning should be made, as all infant teachers know, about as soon as the children enter school. They have already unconsciously obtained notions regarding the features of the country around; they know something of sloping hillsides and their coverings, of streams and their banks, perhaps of the sea with its sandy, pebbly, or rocky coast. They also know where and what are the mills, farms, &c., in their neighbourhood. After a few conversational lessons regarding these and other objects which they may have reason to notice on their way to school, or on short excursions in the neighbourhood, the children begin to take an interest in them, and to observe them more closely. When they are able in their own simple language to tell something of the physical features and industries of their own parish they should be got to evolve from them as many definitions as possible, correct of course, but not as yet to be remembered in set formal phrase. Should the parish be on the sea-coast, or should a neighbouring river be winding, there would probably be some small peninsula by reference to which they might easily be got to remember that a piece of land *almost* surrounded by water is called a peninsula, that the narrow *connecting neck of land* is called an isthmus, and that if this isthmus were cut away there would then be a piece of land *entirely* surrounded by water and this is called an island. When in this manner, by reference to the solid earth itself, as many of the terms used in descriptive geography are made to convey distinct ideas, the teacher should, in sight of his pupils, make by means of clay, sand, water, &c., a rough model of the neighbourhood. If he can, after having completed his model, draw a perspective representation, and then a plan (*i.e.* a map) of it on the blackboard the children at once comprehend one of the most important uses of the map. As it is of the greatest importance that it should be well understood that a map is not a picture but a plan, it would be well if the teacher drew on the blackboard a plan of the class-room to some scale—say one inch to the foot—putting in, in proper position, the tables, desks, doors, &c., taking care that at each step the children clearly understand what is being done. When this is completed each of the children should be made to point out something in proof of their quite understanding it.

After a few days, when they are able to make fairly good plans of the school premises, they may at noon on a sunny day be brought out to the playground

and there they should be made to notice in what direction the shadow cast by a stick lies, and when they have returned to the class-room they should be made to lay their slate-drawn plans in the same relative position, and then through it to draw a line in the same direction as the shadow cast by the stick outside. On being told, they thereafter by referring back to the direction of the shadow, the position of the school, or by thinking of their faces being to the sun at noon, will easily remember which is the north, and which the south, point of the compass. The east and west points can be best remembered by associating them with the rising and setting sun. To confirm, and impress on the memory what has been done, a mariner's compass might be shown and explained, and by its aid a chalk line drawn north and south on the floor. They can at once see, on comparing it with the direction of the shadow, that the needle points north and south or very nearly so. By the aid of the compass another line might be drawn east and west. If the teacher has at hand a map of the parish he should lay it on the floor in proper position in relation to these lines, the children standing round it. A map of the county and then of Scotland might be similarly treated, and thus with very little explanation from the teacher the children would understand that in maps the top represents the north, the bottom the south, the right hand the east, and the left the west. To insure that the relative position of places is, when they see a map, known to pupils at a glance, the teacher should take the county map, and point out the position of the town in which the school is situated, and question somewhat as follows:—'This is where Edinburgh which contains our school lies, and here is Leith (pointing to them both), in what direction should I go to reach Leith?' 'Here is Dalkeith, in what direction does it lie from Edinburgh?' When this has been done, a sketch map drawn by the teacher on the blackboard, and filled in by the aid of the pupils, is an interesting and excellent means of teaching directions, map-drawing, etc. The map of Scotland should then be placed before them, and the comparative smallness of their county pointed out, the markings by which mountains, rivers, etc., are distinguished, explained, should that be necessary after the using of the county map. The physical features should then be taught, and these should as far as possible be taken connectedly. Thus the pupils should understand that the direction in which the rivers and valleys run, and also the shape of many lakes, depend in great measure on the way in which the mountain ranges lie, that the promontories and bays which are all round our coast depend on the ups and downs of the neighbouring land, as well as on the hardness or softness of the material of which the coast is composed. The names to be remembered by the children should be those only of places of very general interest and importance; and of those to be thus remembered the teacher should previously have made a list, and of each place he should be able if possible to tell something of interest to the children so that each name should be associated in the child's mind with some notable event, commercial pursuit, or interesting surrounding. That each of these places may have as many associations as possible linked to it, and may therefore of course be the more easily remembered in connection with these, it is highly desirable that at this and all the following stages the teacher should show as many diagrams, photographs, and pictures from the illustrated magazines and papers as would plainly show what are the chief points of interest connected with the place under notice; and in the geography lesson above all others his own style should be graphic and pictorial. When the physical features are known the children should be got to know what are the chief seats of industry. This will of course include a knowledge of the chief towns, and while learning these the children should be made to understand the causes which have operated in giving these towns their importance. The geography of England and Ireland should then be similarly taught. In revising his work the teacher should sketch a map on the blackboard, the pupils following and telling the names of the places as he puts them in. Here a word may be said regarding the home exercises, which the writer has found most helpful in fixing positions in the memory. After the pupils have several times on their slates tried to make a good outline map, they are then got to make one on a pretty large scale on good paper from their atlases, and they all should be encouraged to become the possessors of good *school* atlases. This outline map of theirs is then to be used as follows:—After the teacher has told them that the lesson for the following day is to be, say, the mountains and rivers south of the Firths of Forth and Clyde, the majority of the pupils in their own way set about learning what these are, and come on the following day prepared to name them and show their position on the map. What they know is supplemented by the teacher in the way already explained, and then he tells them that on the following day they must bring their outline maps with those mountains and rivers which they have named, marked thereon. In this manner a little—and it is a mistake to make the geography lesson a long one—is interestingly and thoroughly well done. Children who have been in school until they have reached this stage, which corresponds with what 'My Lords' require of scholars of the fourth standard (a time at which many children leave school) are, besides being fairly well up in the physical, political, and commercial geography of the British Isles, well able to use a map and geography for themselves when in after life they find it necessary to do so.

Before proceeding to go over the geography of the continents in a similar way it is best to correct the erroneous notions which children form of the relative size of their own country by seeing the maps drawn on different scales hung side by side with it, and also to get them, by means of a large globe, fully to understand the shape of the earth, the relative position and size of the continents, oceans, and zones, with their respective characteristics. A lesson or two should also at this stage be devoted to the explanation of the lines of latitude and longitude. To impress on the class the great use of these lines, it is best to make them feel how exceedingly difficult it is definitely to fix the position of any place on the earth's surface without them, and on the contrary how easy it is to determine the exact position of any point, on land or sea, by their aid.

(To be continued.)

—o—

THE SAILOR'S RETURN.

Allegretto.
1st TREBLE.
2nd TREBLE.
BASS.
Now the wind is blow-ing fresh and fair, Our hearts with joy are swell - ing; For on
Soon shall lov - ing hands be warm - ly press'd, And heart to heart be beat - ing; And the
KEY A. Allegretto.
home, and all who love us there, Our thoughts are fond - ly dwell - ing.
sai - lor's home be dou - bly blest, With love's own ten - der greet - ing.
Dis - tant hills now rise be - fore us, Loud the dash - ing break - ers roar,
Then shall eyes be fond - ly tell - ing, More than words can e'er re - veal,
Like a joy - ous cho - rus sound - ing From our own sweet na - tive shore.
And the tear of joy be swell - ing, Show - ing how dear friends can feel.

Model Answers to Certificate Questions.

BY A. BARRIDALL, B.A.

Male and Female Candidates.

SECOND YEAR.

French.

SECTION I.

[*Male* Candidates may answer questions in TWO Languages; *Female* Candidates in ONE only.]

[Two hours allowed for this Paper for *Male* Candidates; THREE hours for *Female* Candidates.]

A.

Translate into English the following passages :—

Le vif intérêt qu'elle inspira bientôt à M. de K., ministre de l'intérieur, ainsi qu'à toute sa famille, aplanit toutes les difficultés. Cet homme respectable possédait deux avantages qui se trouvent rarement réunis dans les personnes en place, le pouvoir et le désir d'obliger ; et plus d'une fois les services qu'il aimait à rendre prévinrent les démarches des malheureux. M. de K. mit toute l'obligeance qui lui était naturelle à terminer la révision du procès dont il était chargé ; et depuis ce moment l'interessante solliciteuse n'eut plus aucune inquiétude sur son sort à venir. Connue à la cour et favorisée du ministre, Prascovie voyait avec plus de surprise encore que de joie l'empressement subit que le public lui témoignait. La princesse Y. et Mme. W. lui assurèrent l'une et l'autre une pension de cent roubles. Cette faveur générale n'influa point sur sa manière d'être, et ne lui donna jamais le moindre mouvement de vanité. Elle avait dans le monde cette assurance que donne la simplicité.

A.

The keen interest which she kindled in M. de K., the Home Minister, as well as in all his family, cleared away all her difficulties. This notable man had two excellent qualities rarely found together in persons in authority—viz., power, and the wish to oblige ; and more than once did the good offices he was pleased to perform exceed the requests of his unhappy petitioners. M. de K. used all his natural kindness to bring to an end the reconsideration of the trial with which he was entrusted ; and from that time the interesting petitioner had no uneasiness whatever as to her future fate. Known at the Court, and regarded favourably by the minister, Prascovie saw with more astonishment even than pleasure the sudden and eager interest the public evinced in her. The Princess Y. and Mme. W. both guaranteed her an annuity of 100 roubles. This general favour did not at all influence her demeanour, nor did it kindle in her the slightest feeling of vanity. She possessed in society that self-assurance which simplicity gives.

B.

Vous perdez le respect ; mais je pardonne à l'âge,
Et j'excuse l'ardeur en un jeune courage.
Un roi dont la prudence a de meilleurs objets
Est meilleur ménager du sang de ses sujets :
Je veille pour les miens, mes soucis les conservent,
Comme le chef a soin des membres qui le servent.
Ainsi votre raison n'est pas raison pour moi ;
Vous parlez en soldat, je dois agir en roi ;
Et quoi qu'on veuille dire, et quoi qu'il ose croire,
Le comte à m'obéir ne peut perdre sa gloire.
D'ailleurs l'affront me touche ; il a perdu d'honneur
Celui que de mon fils j'ai fait le gouverneur ;
S'attaquer à mon choix, c'est se prendre à moi-même,
Et faire un attentat sur le pouvoir suprême.
N'en parlons plus. Au reste, on a vu dix vaisseaux
De nos vieux ennemis arborer les drapeaux :
Vers la bouche du fleuve ils ont osé paraître.

B.

You are forgetting the respect due to me ; but I pardon your age, and excuse zeal in youthful courage. A king whose foresight is directed to obtain better objects, is the better able to control and guide the spleen of his subjects ; I watch over my people, my care preserves them, just as the head has care for the limbs which serve it. Thus then, your reason is no reason for me ; you speak as a soldier, I must act as a king ; and whatever one may say, or whatever he may venture to think, the count by obeying me cannot lose his honour. Besides the insult affects me ; he has wounded the honour of him whom I have made tutor of my son ; to set upon my choice is to assail me and to commit an outrage upon the supreme power. Let us say no more about it. Well then, ten of our old enemy's ships have been seen hoisting their flags ; they have dared appear at the mouth of the river.

SECTION. II.

Translate into French the following passages :—

These men appear to have nothing savage about them but their dress : this is of rein-deer (renne) skins, which cover them from head to foot. With the exception of the chiefs, who have their heads covered with a sort of cloth cap lined with furs, they all wear rein-deer skin caps, with the hair outside (translate : 'of which the hair is outwards). They wear their hair long, united into a single long plait (tresse). They are short of stature ; they have wide, flat faces, small eyes, and short legs. Although our sailors had received them with friendship, they would not even allow the strangers to approach their tents, or to touch their weapons ; but they were willing to exchange whale-oil for steel knives.

It is early yet : I think we shall be able to cross the bridge again ; if not, we must retrace our steps.

Accept my sincerest thanks ; I do not really know how to evince my gratitude to you for the favours I have just received.

I used occasionally to go to his house and make him mend my clothes, thinking that he was more skilful than was really the case.

If her father had been taken from her by an ordinary death, she would have found in her lover the only alleviation she was capable of receiving.

The king ordered Don Diego to take care that both parties behaved like men of spirit, and after the conclusion of the fight, to bring the conqueror to him.

SECTION II.

Il n'y a en apparence rien de sauvage dans ces hommes sauve leurs habillements ; ceux-ci se composent des peaux de renne, qui les couvrent de la tête aux pieds. Leurs chefs exceptés, dont les têtes sont couvertes de casquettes de drap, ils portent tous des casquettes de peau de renne desquelles le poil est au dehors. Ils ont les cheveux longs, joints dans une seule longue tresse. Ils ont la taille petite, la figure large et platte, les yeux petits, et les jambes courtes. Quoique nos matelots les eussent reçus amiablement, ils ne voudraient permettre aux étrangers de s'approcher de leurs tentes, ou de toucher à leurs armes ; mais ils voulaient bien changer de l'huile de baleine pour des couteaux d'acier.

Il est encore de bonne heure : je crois que nous pourrons traverser encore le pont : sinon, il nous faut revenir.

Acceptez mes remerciments les plus sincères ; en effet, je ne sais pas vous faire voir ma reconnaissance pour les faveurs que je viens de recevoir de vous.

J'allais autrefois de temps en temps à sa maison, et lui faisait raccommoder mes habits, croyant qu'il fut plus habile qu'il ne le fut en réalité.

Si son père lui avait été enlevé par une morte ordinaire, elle aurait trouvé dans son amant le seul soulagement qu'elle pouvait recevoir.

Le roi ordonna à Don Diego d'avoir soin que les tous deux combattants se conduisissent en hommes de cœur, et après le combat d'amener à lui le vainqueur.

SECTION III.

1. Parse fully (*a*) or (*b*) :—

(*a*) Le lecteur sera sans doute aussi surpris qu'elle le fut elle-même en apprenant qu'au lieu de quatre vingt kopecks elle en trouva cent vingt.

(*b*) Je m'en tiens trop heureux, et mon âme est ravie
Que mon coup d'essai plaise à qui je dois la vie.

2. 'Je suis brouillé avec mon ami.'—'Je me suis brouillé avec mon ami.' Translate accurately, and explain the grammatical difference between these two sentences.

3. Distinguish between the uses of qui and lequel, with illustrations.

4. 'Elle s'arrêta pour s'orienter.' Explain the origin of the accent on 'arrêta,' and the reason for the pronominal form of the verb. Give the meaning and derivation of 's'orienter.'

5. Correct the following sentences:—

'Il a ni cœur ni principe.'
'Je ne vous ferai pas des reproches ou à votre fils.'
'Il y a deux milles deux cent quarante livres Anglais dans une tonne.'
'Une pierre a tombé et a cassé sa jambe.'
'Quel que soit leur prudence, ils n'échapperont pas la mort.'
'Je ne crois pas qu'elle s'est encore en allé.'

SECTION III.

1. (*b*) *Je*—Conjunctive pron., sing., common, 1st, nom. to tiens.
me—reflex. pron., sing., com., 1st, accus., gov. by tiens.
en—pron., sing., neut., 3rd, gen. case, gov. by heureux.
tiens—trans. irreg. verb, act., pres., indic., sing., 1st, ag. with je.
trop—adv. of degree, modif. heureux.
heureux—adj. of qual., qual. me.
et—cop. co-ord. conj., joining 2 sentences.
mon—poss. adj. pron., sing., fem. gen. (mas. form for euphony) ag. with âme.
âme—noun, fem., sing., 3rd, nom. to est ravie.
est—aux. v., sign of pass. voice.
ravie—past part. of ravir, fem., sing., agree with âme.
Que—subord. conj. of reason joining 2 sentences.
coup d'essai—compound noun, sing., mas., 3rd, nom. to plaise.
plaise—intrans. verb., act., subj., pres., govd. by que, sing., 3rd, ag. with coup.
(Observe the construction is abbreviated here 'à celui' being omitted.)
à—prep., gov. qui, relating *celui* (understood) and *qui*.
qui—rel. pron., disjunctive, sing., mas., 3rd, governed by à.
dois—trans. verb, act., indic., pres., 1st, sing., ag. with je.
vie—noun, sing., fem., 3rd, governed by dois.

2. 'Je suis brouillé avec mon ami' = 'I am at variance with my friend.' Here brouillé is a participial adj., not a participle, thus 'suis brouillé' does not form a compound verb in the passive voice.
'Je me suis brouillé avec mon ami' = I have fallen out with my friend (and have been the cause of the disagreement). Here the verb 'se brouiller,' a reflexive verb, is employed. Thus we have the past indef. tense of the active voice of a reflexive verb.

3. *Qui* is used for *whom* after prepositions, as *la femme à qui vous parliez*, the woman to whom you were speaking.
Qui is the ordinary relative, having for its antecedent a noun denoting persons or things. As *l'homme qui venait ici.*
Lequel, owing to its being able to take the feminine gender 'laquelle' is used where there are more than one possible antecedent, to prevent ambiguity.
E.G. La femme de mon ami, laquelle est très aimable, a donné à cet enfant deux livres. *Qui* used here might have referred to ami.
In case 1 of QUI, 'auquel' is sometimes used for 'à qui.'

4. The circumflex accent indicates the dropping of the letter 's.' The old French verb was 'arrester,' from Lat. *ad, resto.* *Se*, the reflexive pronoun, is used because the action is performed upon oneself. Many of our intransitive verbs, as 'stop,' were originally transitive, reflexive, or pronominal verbs, but have lost the reflexive object.
S'orienter means 'to look about to see where you are.' The word comes from 'orient,' the East, from Lat. *orior*, 'I arise.' It means, therefore, to find out for yourself where the sun rises, and thus knowing where the East is, to settle your whereabouts.

5. 'Il n'a ni cœur ni principe.'
'Je ne ferai pas de reproches ni à vous ni à votre fils.'
'Il y a deux mille deux cent quarante livres Anglaises dans une tonne.'
'Quelle que soit leur prudence, ils n'échapperont pas à la mort.'
'Une pierre est tombée, et lui a cassé la jambe.'
'Je ne crois pas qu'elle s'en est encore allée.'

Political Economy.

(1.) Distinguish briefly but accurately between the following economical terms, giving simple illustrations:—Wealth and Capital, Production and Distribution, Value and Price, Profit and Interest.

Wealth is anything that has exchange value. *Capital* is that portion of wealth used in the production of other wealth; *e.g.*, if I have £50, that is wealth; but if I keep £25 of it in a box and use the other £25 in trade, this latter only is *capital.*

Production (of wealth) is the employment of land, labour, and capital to increase the number of useful things.

Distribution (of wealth) is the division of wealth among the owners of the above three agents of production. Thus while *production* is carried on by land, labour and capital, wealth is *distributed* into rent, wages, and profits.

The *Value* of any commodity is estimated by the quantity of other matter whose value is known, for which it will exchange.

Price is the value of a commodity estimated in money.

Price therefore is only a particular case of *value*; *e.g.*, I have a house which is worth two other adjoining houses; 'two other adjoining houses' expresses the value. But if I say the house is worth £1,200, I then express its price.

Profit is the return capital gets for the service it renders in the production of wealth.

Interest is the sum which a lender of capital receives from the borrower in consideration of the loan.
Interest is only a portion of *profit* which has the three following elements—*interest on capital*, compensation for risk, and wages of superintendence; *e.g.*, I may lend a company £500 at the rate of say 5 per cent., and have the right of making the first claim in case of the failure of the company. But if I invest this sum in the affair, I *may* lose the whole sum. I attend meetings, *i.e.*, I devote time to the conduct of the enterprise, and I deprive myself the ability to get interest on that money anywhere else. If the company succeeds I ought therefore to receive more than the mere lender.

(2.) What do you understand by the economic principle known as the 'Law of Diminishing Returns'? Compare the operation of the law in Agriculture and in Manufactures.

Ans. 'After a certain amount of capital has been applied to land every increase in produce is obtained by a more than proportionate increase of capital; unless the arts of agriculture are meanwhile improved.'
If a virgin soil be cultivated, for some years the produce is very considerable, and with but little or no manure the crops continue excellent; after awhile the stored-up richness of the soil having been largely drawn on, the crops begin to lessen, and only by increasing applications of manure, *i.e.*, by the employment of more capital, can an adequate crop be obtained.
However, by the invention of machinery which lightens the work of agriculture, and often, by the saving of time effected by its use, a saving is made in labour, and crops are now often garnered which in older times would have been spoilt by bad weather.
Manufactures are of course dependent on the supply of raw material. Now, while in agriculture the application of manure in large quantities is fairly well paid for by large crops, in *mining*, when the richest mineral strata have been discovered and dug, there will be a great difficulty, if not impossibility, to supply the demand for the metal. No amount of increase of capital could produce the yield of former days. We see then the effect would be to raise the price of raw material. But the arts of manufacture are constantly progressing, and material of poorer character can be used. In manufactures the machinery after awhile shows the results of wear and tear, and large sums have to be expended that the turn-out of manufactured material may not diminish.

(3.) Of what distinct elements is industrial profit made up? Explain by means of your answer the differences in the rates of profit made in different industries.

Ans. 'Industrial profit' consists of the following three elements: 1st. Interest on Capital; 2nd, Compensation for risk; 3rd, Wages for superintendence.
Let us illustrate from the cases of a butcher and a draper; we may consider that they both have the same amount of capital, and that they take into consideration the interest they could safely have got for their money had they merely invested it with other people.

The profits of the successful butcher will be greater than those of the successful draper because the superintendence of the butcher's business would be far more disagreeable than that of the draper, and must therefore be better paid; again, there is greak risk attending the butcher's investments; his whole stock of meat may be destroyed by a change in the weather, and to cover this risk he must make a larger margin of profit for himself generally. A bad season of course affects the draper too, but not nearly so seriously.

(4.) How is the efficiency of labour likely to be affected by—(a) Improved sanitary arrangements: (b) Superior technical education.

(a) All sanitary arrangements are conducive to good health; energy naturally follows, and thus more work would be done in the same time. Again, healthy surroundings tend to improve morality. Bad smells, poor light, and indifferent ventilation cause those working in such circumstances to resort to intoxicating drinks and the use of tobacco. These enervate, and the produce of labour suffers.

(b) Superior technical education would make labour more efficient, in that children would be scientifically instructed in early youth, when the eye and the hand are most easily trained. They would therefore be far advanced in training at an age when now youths are just beginning to be apprenticed. The apprentices, too, would then be acquainted with the principles of things, they would bring more intelligence to their work, and would be far less dependent on the kind of master into whose hands they should fall.

(5.) State and explain Ricardo's 'Theory of Rent.' What chief objections have been urged against this theory, and how have they been met?

'The rent of the less productive farm is determined by the pecuniary value of the excess of its productiveness over that of the worst land in cultivation which pays only a nominal rent.'

Some land is so rocky and barren as not to pay for the labour expended on it. Other land will pay just sufficiently to remunerate the labourer, provided he can have the land rent free. Of course, this land would be worth cultivating or not, according to the price of agricultural produce. The above theory states that the rent of a farm should be the value of the difference between the crops of that farm and the same amount of land above described, which is let at a nominal sum, *i.e.*, practically rent free.

It has been objected that the landlord would be the only one to reap the benefit of a rise in the price of agricultural produce, and that he has a twofold rise in his rent. For, as the value of food rises, the amount of it which is necessary to remunerate the farmer for his outlay diminishes, and therefore the surplus portion which the landlord can claim as rent increases in amount. And, as each part of this surplus rises in value, the value of the rent is also raised.

But if there is a fall, the landlord meets with a double fall in rent, and thus the theory seems fair.

Again, in a country that imports a great deal of food, however productive the farmer makes his land by improvements, there will be but little change in the amount of produce required to return the farmer's outlay with profits; the landlord will get the most of the increase.

But in a country that produces its own food, improvements in the art of cultivation would increase the supply over the demand, and thus prices would fall, and the landlord suffer. The theory, therefore, seems as just as a theory could be where there are so many changing circumstances.

(6.) Point out carefully in what way, and subject to what limitation, the invention of labour-saving machines is beneficial to the labouring classes?

Ans. Labour-saving machines produce the manufactured article at a lower price and the labouring classes as *consumers* are benefited thereby. Such machines often enable an article to be sold at a very much lower price. The consequence is that the demand for it is greater, and a large number of the labouring class are employed to work the machines. But for these machines the British farmer and manufacturer would not have been able to compete with the foreign producers; the farms and factories would then not have been worked, and the labouring classes would have been driven to emigration.

Where the labour-saving machines are not employed to produce articles that the labouring classes consume, and where these machines do not, by cheapening articles as above mentioned, lead to many being employed, they injure the labouring classes.

(7.) How far does the value of a commodity depend upon its cost of production, and how far upon supply and demand?

In the first place it will not be worth the producer's while to produce the article if he cannot sell it for more than its 'cost of production.' The cost of production, therefore, fixes the minimum value of the article. If there is a great demand for it, so long as the supply is unequal to the demand the price will be as high as people will give for it; the highest bidder will have it. But the high profit thus gained attracts others to produce the same article. This competition brings down the price, and when the supply exceeds the demand the producers will strive to sell their goods at a low remunerative sum rather than keep their capital lying idle. The manufacturer will cease to produce directly the competition becomes so keen as to leave him no profit over the cost of production.

(8.) What different effects would a deficiency of supply have upon the price of an article of luxury, and of an article of necessity? Take the cases of bread and oysters.

All *must* have bread; the demand would therefore remain practically undiminished (of course waste would cease). Consequently the price would rise, those in possession of flour making as high a price as they could get. The consequence of such a state of things would then be the starvation of the poor who lacked the price of the bread.

Oysters are a luxury; in no sense a necessity of life. If they were scarce the price would be raised and people who before bought them would, if they were now beyond their means, simply do without them. Thus, in the case of a luxury, a diminished supply is always accompanied by a diminished demand, and thus luxuries do not reach that extremely high price they would reach if, as in the case of bread, the demand remained the same.

(9.) Describe briefly the chief European forms of the tenure of land, and point out their economical advantages and disadvantages.

In England and Scotland farms are generally taken at rents regulated by *competition* or the rack-rent system. The advantage of this is that no man will take the farm at a rent which will not fairly remunerate him. He takes his farm, however, for a lease upon the expiration of which he may have his rent raised. This is a disadvantage in that it prevents a farmer during the latter years of his tenure from putting into the land manure, or from making permanent improvements which he will not reap the full benefit of. Under this system the tenants reap no permanent advantage from the productiveness of the soil.

The *Metayer* system prevails in parts of Italy and France. Here a custom prevails that the landlord shall have two-thirds of the produce as his rent. Now it is evident that farmers in lands of different productiveness are differently paid for their labour. But the advantage of this system is that both tenant and landlord are interested in the maintenance of the productiveness of the soil. The chief economic defect of this system is that it prevents expenditure of capital in such permanent improvements as draining.

The Ulster Tenant-right system. The in-coming tenant pays to the out-going tenant a certain sum, partly as a consideration for the good will of the farm, and partly as compensation for unexhausted improvements. The other part of the rent is paid to the landlord. Its advantage is, that the tenant has thus a proprietary right in the soil. However this system is sometimes condemned because it diminishes the capital of the tenant just when he wants it most to stock his farm. The practical effect is satisfactory.

The Cottier System.—This system very generally prevailed in Ireland before the Irish famine. The rent is raised as high as competition will force it, and owing to the excessive agricultural population a rent is often agreed to far exceeding the value of the produce of the farm. The tenant knows the landlord will let him have sufficient potatoes for himself and family to exist on, but is prevented from striving to increase the produce from the consideration that the landlord would take the increase to pay off arrears. This system is most demoralizing.

(10.) Free trade has sometimes been called 'A territorial division of labour.' Explain and illustrate the statement with special reference to British commerce.

Certain countries have special facilities for special manufactures. For example the finding of iron and coal together especially qualifies us for the manufacture of iron goods. We

could, in spite of the high price of labour in this country, produce iron goods at a much less cost than a country with only one or neither of those minerals. America produces wheat and rears cattle at a much less cost than we. What free trade advocates is that all protective duties should be done away with, so that each country should produce that for which it has special aptitude. We should then obtain at the lowest prices possible the best goods. Many countries that now manufacture goods that we manufacture would cease so to do and we, who have no protective duties, should reap the advantage of a largely extended trade.

(11.) What is meant by a *single*, and by a *double* monetary standard? Which obtains in England? Under what regulations have we coins of three different metals in circulation?

The meaning of a *single* monetary standard is that it is legal to pay a debt beyond a certain amount in coins of one metal only.

The meaning of the expression 'a double standard' is that it should be legal to offer either gold or silver in payment of any debt, however large. We have only a 'single standard of value' in England.

The silver and copper coins are only subsidiary. No debt of more than 40s. can be paid in silver, nor more than 5s. in copper without the creditor's consent.

(12.) Point out what appear to you to be the chief causes of the successful management of the business of the Post Office by the Government. Would the same equally apply to the Government management of Railways?

I. There is but one machinery, and thus little or no waste of labour; *e.g.*, suppose we have three or four Postal Companies, each of these must have its collector or agent in every country village. But with *one* management this expenditure is saved, as one man can do all the work required. This applies also to the rolling-stock, &c.

II. A 'ring' or partial monopoly might be formed by a few great companies to keep up the price of postage. This is obviated by the present arrangement.

III. There is a feeling of perfect security in the public mind.

I think the same would equally apply to railways. There is a good deal of monopoly on railways now; and the rates for the carriage of goods are so excessive as to cripple English trade. Doubtless the passenger rates too would be diminished and yet under a well organised plan a considerable addition might be made to the revenue.

(13.) Tell what you know of the history of the Income Tax as a part of the English financial system. Point out its merits and defects, as judged by any canons of taxation with which you are acquainted.

In 1842, to replenish a failing exchequer, Sir Robert Peel proposed and carried an Income Tax. A tax of 7d. in the £ was levied on all incomes amounting to £150 and upwards. For 10 years it remained unchanged, realizing about 5½ millions per annum. In 1854 Ireland was included, and the tax carried down to incomes of £100, but on incomes below £150 the tax was 5d., above £150 it was 7d. From 1853—1863 the amount varied from 7d. to 1s. 4d. in the £, and realized in 1856 the sum of £16,000,000.

In 1863 those with incomes of less than £150 had the tax remitted from the first £60, and later off the first £80. Now too the tax became uniform again. In 1873 it was reduced to 3d. in the £, and those with incomes less than £400 had the first £120 free from tax; and in 1874 Mr. Gladstone proposed to abolish it altogether; he was defeated, and his successor lowered it to 2d. Mr. Gladstone has recently raised it to 8½d.

The tax is most serviceable to statesmen, on account of its great elasticity.

The Income Tax is nearly in accordance with the first of the canons of Taxation of Adam Smith, viz., 'that every subject should contribute a sum proportionate to the income which he enjoys under the protection of the State.' There is little doubt that if this canon were rigidly applied, it would press with undue severity on those with small incomes.

The changing of the amount of this tax violates Smith's second canon 'that taxes ought to be certain, and not arbitrary.' As to the *time* of collection, the practice tallies fairly well with the third canon, 'that every tax ought to be levied at the time and in the manner in which it is most convenient for the contributor to pay it.' But as to the *manner* of payment, the practice does not accord with the canon.

A large sum is expended in the collecting of this tax, but it is difficult to see how to diminish that expenditure. Smith, in his fourth canon, requires 'that every tax ought to be so contributed as to take out and keep out of the pockets of the people as little as possible over and above what it brings into the public treasury of the State.'

(14.) Prepare the outlines of a lesson to an advanced class on 'The System of Industrial Partnerships.'

Why is there so much antipathy between employer and employed?

Is it not often that the employer notices the want of application and zeal and honesty on the part of his men, and that the employed look with greediness upon the profits of their labour which go into the employer's pocket, in other words that the interests of the two are at variance?

How can this be remedied? What can be done to make the employed use their time well, and yet feel satisfied with the remuneration they receive?

To effect this what are called 'Industrial Partnerships' have been invented.

Let us suppose there are three partners in a firm, A, B, C. Let A and B be two gentlemen hitherto employers, and investing in the business £5,000 each, and that C, the third partner, consists of some 300 persons—the employed. A and B take each year £250 each as their salary, and divide the profits of the concern into two. One of these parts is divided between A and B, and the other part is divided equally among the 300 employed, who have all along received wages.

What would be the effect of such a plan? The men would find that the harder they worked the more profits they would have.

But, you say, would there be no lazy ones? Possibly yes. How can this be met? By the master reserving the right to withhold a share of the profits from such a person.

What would be the economic advantage?. The efficiency of labour would be increased.

Male and Female Candidates.

SECOND YEAR.

Latin.

SECTION I.

[TWO hours allowed for this Paper for *Male* Candidates; THREE hours for *Female* Candidates.]

Male Candidates may answer questions in TWO Languages; *Female* Candidates in ONE only.

1. Translate into English:—

(*a*) *His constitutis rebus*, nactus idoneam ad navigandum tempestatem, tertiâ fere vigiliâ solvit; equitesque in ulteriorem portum *progredi*, et naves conscendere, et *se sequi*, *jussit*; a quibus cum id paulo tardius esset administratum, ipse horâ diei circiter IV, cum primis navibus Britanniam attigit; atque ibi in omnibus collibus expositas hostium copias armatas conspexit. Cujus loci hæc erat natura: adeo montibus angustis mare continebatur, uti ex locis superioribus in litus telum adjici posset. Hunc ad egrediendum nequâquam idoneum arbitratus locum, dum reliquæ naves eo convenirent ad horam IX in ancoris exspectavit.

(*b*) Tuque, o sanctissima vates
Præscia venturi, da non indebita posco
Regna meis fatis, Latio considere Teucros,
Errantesque deos, agitataque numina Trojæ.
Tum Phœbo et Triviæ, solido de marmore templum
Instituam, festosque dies de nomine Phœbi.
Te quoque magna manent regnis penetralia nostris:
Hic ego namque tuas sortes, arcanaque fata,
Dicta meæ genti, ponam, lectosque sacrabo,
Alma, viros. Foliis tantum *ne* carmina *manda*,
Ne turbata volent rapidis ludibria ventis.
Ipsa canas oro. Finem dedit ore loquendi.

(*c*) Sunt geminæ Somni portæ; quarum altera *fertur*
Cornea, qua veris facilis datur exitus umbris;
Altera candenti perfecta nitens elephanto;
Sed falsa ad cælum mittunt insomnia Manes.
His ubi tum natum Anchises unaque Sibyllam
Prosequitur dictis, portaque emittet eburna:
Ille viam secat ad naves, sociosque revisit.

2. Parse the words printed in italics.

3. Trace the origin, and distinguish the parts of the words *exitus, egrediendum, exspectavit, continebatur.*

4. Scan the lines in the third Extract, and mark the quantities of the syllables.

SECTION I.

(*a*) When he had resolved on these plans, a wind favourable for sailing having arisen, he set sail about the third watch; and ordered the cavalry to advance to the farther harbour, embark, and follow him. Since this order was carried out rather too slowly, he himself, about the fourth hour of the day, reached Britain with the first ships, and there saw the armed forces of the enemy drawn up on all the hills. This was the character of the place: the sea was so confined between narrow promontories, that from the higher positions a javelin could be thrown on to the shore. Thinking this by no means a suitable place for disembarking, he waited at anchor until the rest of the ships arrived at the ninth hour.

(*b*) And thou, too, most holy prophetess, acquainted with the future, grant (I do not ask for regions not destined me by fate) that the Trojans, their wandering gods, and the persecuted deities of Troy may settle in Latium. Then will I erect to Phœbus and Trivia a temple of solid marble, and a season of festivity named after Phœbus. A large sanctuary awaits thee, too, in our realms, for in this, O benign (prophetess), will I place thy oracles, and the secret fates declared to my race, and I will set apart men chosen (for thy service). Only do not commit thy oracles to leaves, lest they fly about in disorder, the sport of the rapid winds. I beseech you to tell them (to me) yourself. He made an end of speaking.

(*c*) Of Sleep there are two gates, of which, one is said to be of horn, by which ready egress is given to true visions; the other, brilliant and made of gleaming ivory; but (by its means) the Shades send up false visions to the upper world. When Anchises had addressed these words to his son and the sibyl together, and had sent them away by the ivory gate, he (Æneas) made his way to the ships, and revisited his friends.

2. *His*—demons. adj., plur., fem., abl., ag. with rebus.
constitutis—perf. part., passive, fem., abl., plur., ag. with rebus.
rebus—noun, 5th decl., fem., plur., abl., absolute.
progredi—infin. of depon. verb, gov. by jussit.
se—reflex. pron., acc. case, gov. by sequi.
sequi—infin., depon., gov. by jussit.
instituam—verb, trans., 3rd conjug., indic., act., fut., 1st sing., ag. with (ego).
ne—neg. adverb, gov. manda.
manda—trans. verb, 1st conjug., imper. mood, act., 2nd sing., ag. with (tu).
fertur—trans., irreg. verb, pass., pres., 3rd sing., ag. with altera.

3. *Exitus*—Ex, out; and *itus*, a going; *itus*, p. p. of eo I go.
Egrediendum—*E*, out; and *gradior*, I step; *gradus*, a step. *endum* is the gerundial ending.
expectavit—*ex*, out; and *specto*, I look, frequentative of *specio*, I look; *avit* is the perf. act. ending.
continebatur—con (=cum) with, and *teneo*, I hold; *bat* is the imperf. tense ending, and *ur*, the passive 3rd pers. termination.

4.

Sūnt gĕmĭ | nae Som | nĭ port | ae; quā | rum ăltĕrā | fertŭr
Cornĕā, | quā ve | rĭs făcĭ | lĭs dătŭr | exĭtŭs | umbrĭs;
Ăltĕrā | cănden | tĭ pĕr | fectā nĭ | tens ĕlĕ | phantō;
Sed făl | sa ad coel | um mĭt | tunt ĭn | sŏmnĭă | Mānes.
His ūbĭ | tūm nā | tum Anchĭs | ĭs ūn | āquĕ Sĭ | bўllam
Prosĕquĭ | tur dĭc | tĭs, por | tāque em | ĭttĕt ĕ | burnā
Ĭllĕ vĭ | am sĕcāt | ăd năv | ĕs, sŏcĭ | ōsquĕ rĕ | vĭsit.

SECTION II.

1. Translate into Latin:—

(*a*) The wisdom of the Senate will preserve the city.

(*b*) Cæsar wished to send forward his forces.

(*c*) Part of the enemy remained in this place, on account of the season of the year.

(*d*) The inhabitants of the provinces have been spared by the merciful conqueror.

(*e*) What animal is more rapacious than the lion?

(*f*) He is not happy whose riches are great; but he who is content with what he possesses.

(*g*) The whole army might have been destroyed, but darkness prevented the conquerors from following up the fugitives.

SECTION II.

1. (*a*) Senatūs sapientia urbem conservabit.

(*b*) Cæsar voluit copias suas praemittere.

(*c*) Pars hostium hic (or in hoc loco) manebat, propter anni tempus.

(*d*) Regionum incolis (or provincialibus) parcitum est a clementi victore.

(*e*) Quod animal rapacius est leone (or quam leo)?

(*f*) Non is cui sunt magnae divitiae est beatus, sed qui eo quod habet est contentus.

(*g*) Minime afuit ut totus exercitus deleretur, sed nox prohibuit victores fugitivos sequi (or prohibuit quominus victores fugitivos sequerentur.

SECTION III.

1. Explain these idioms—*quam longissime: nescio an nihil dixerit: pudet me stultitiæ: interest omnium recte facere.*

2. In what way are the verbs *fio, furo, inquam, nolo,* and *memini* either defective or irregular?

3. Distinguish between the uses of *quando* and *cum* (temporal); *sed* and *atqui*; *post* and *pone*; *forte* and *fortasse.*

4. Take the following adjectives, explain their meanings, and give the verbs from which they are derived:— *Æquabilis, Probabilis, Fugitivus, Enarrabilis, Nominativus, Fictilis.*

5. Give six Latin prepositions which should be followed by a Dative, and six which should be followed by an Accusative; and give in each case an example.

SECTION III.

1. *Quam longissime* = as long as possible; in this construction *potuit* is generally omitted as here.

Nescio an nihil dixerit = I rather think he said nothing. This and similar phrases 'haud scio an,' &c., imply the probability of what they introduce; 'dixerit' is subj. because *an* introduces an indirect question.

Pudet me stultitiæ = I am ashamed of my folly; literally, 'It repents me of my folly. This use of impersonal verbs arose from the custom of attributing our emotions to external causes.

'*Interest omnium recte facere*' = It is to the advantage of everybody to act honourably. Omnium is governed into the genitive by *interest*; a subject accusative, '*omnes*,' is understood before facere.

2. *Fio* has in the non-perfect tenses an active form with a passive signification. It acts as the passive of facio. In its perfect tenses it takes the passive form, as also in the infinitive.

Furo takes furui in the perfect and furĕre in the infinitive. It has no supine, and therefore no passive perfects, nor active future participle.

Inquam has no other parts than the following:—*Indic*, pres., all persons sing. and plural; Future 2nd and 3rd sing.; Imperfect all persons sing. and plural; Perf. 2nd and 3rd sing.; *Imperative*, 2nd sing. pres. and future. It has no passive.

Nolo is a contraction of non volo, and shows these two parts distinct in the pres. ind c., 2nd and 3rd pers. sing., and 2nd pers. plur. It has no supine and therefore no future part. No passive.

Memini has no present forms. All its forms are perfect but have a present signification. No supine nor future participle.

3. *Quando* when used temporally is employed to introduce a question direct or indirect.

Quum is never used as an interrogative, but is a conjunction followed by the indicative when used to denote the exact time at which an event happens. When used to denote historic sequence, it takes the subjunctive.

Sed denotes a direct and emphatic opposition to what has preceded; *atqui* = '*and yet*,' '*but, you say*;' it is especially used in stating an objection.

Post is used to denote 'behind' both literal and figurative, it also denotes 'after.' It compounds with many verbs.

Pone is only rarely used and then is used literally for 'behind.'

Forte = by chance, accidently.

Fortasse = perhaps, possibly, probably.

4. *Aequabilis* = like, similar — Aequo, I make equal; *Probabilis* = not impossible — probo, I try, examine; *Fugitivus* = fleeing — fugito, I flee, frequentative of fugio.

Enarrabilis, able to be narrated—narro, I relate; *Nominativus*, stating a name—nomino I name; *Fictilis*, made of clay—fingo, I mould.

5. There are no Prepositions in Latin that govern the *Dative* Case.

The following are followed by the Accusative.

Ad—as Ad Italiam contendit.
Ante—as Ante templum steterunt.
Contra—as Contra Caesarem Pompeius locutus est.
Infra—as Infra manum liber fuit.
Post—as Post me intravit.
Trans—as Trans flumen pontem injecerunt.

Male Candidates.

SECOND YEAR.

Grammar.

1. Paraphrase three of the following passages :—

Had you not been their father, these white flakes
Had challenged pity of them. Was this a face
To be opposed against the warring winds?
To stand against the deep dread-bolted thunder?
In the most terrible and nimble stroke
Of quick, cross lightning? to watch—poor perdue!—
With this thin helm? Mine enemy's dog,
Though he had bit me, should have stood that night
Against my fire.

Anon they move
In perfect phalanx to the Dorian mood
Of flutes and soft recorders; such as raised
To highth of noblest temper heroes old
Arming to battle; and instead of rage,
Deliberate valour breathed, firm and unmoved
With dread of death to flight or foul retreat.

Public envy is as an ostracism, that eclipseth men when they grow too great; and therefore it is a bridle also to great ones, to keep within bounds.

It will not be easy to find, in all the opulence of our language, a treatise so artfully variegated with successive representations of opposite probabilities, so enlivened with imagery, so brightened with illustrations.

1. Apart from the fact of your being their father, one would have thought these snowy locks alone would have sufficed to rouse their pity. Did this dear face look as though it could bear exposure to the raging elements, and resist the might of Jupiter's bolts? Did he look as if he could unharmed submit to the furious lash of forked lightning, and roam about forlorn and sleepless with no other protection than these sparse locks afford? On such a night as that, I would have warmed at my hearth my bitterest and most contemptible foe.

Forthwith they march in perfect order drawn up in close array, accompanied with Grecian strains of pipes and mellow flageolets, such as were wont to fan into flame the valour of ancient warriors about to enter the battle-field; not rendering them blindly furious but inspiring them with that cool collected courage which led them unwaveringly to die at their post rather than incur the ignominy of cowardice by basely fleeing.

The envy of the public acts much as the ancient custom of *Ostracism* which exiled a man whose individual greatness was considered dangerous to the State; its effect is therefore to control the ambition of those in high places.

Innumerable as are the works of English writers, it would be difficult to discover a work in which the writer has so skilfully kept the interest keen by repeatedly showing both sides of a question probable in turn, and by the introduction of beautiful flights of fancy, and apt example.

2. Explain eight of the following—the mysteries of Hecate—what makes that frontlet on?—gasted—thou zed!—those pelican daughters—to scant my sizes—warping on the eastern wind—mixed with Tartarean sulphur—ambrosial odours—paramount—Serbonian bog.

Hecate was another name for the goddess Trivia who had three forms and names, Luna (Moon), Diana, and Proserpine, according as she was in heaven, earth, or hell. She presided over magic and enchantments.

The frontlet was a head-dress worn over the forehead by ladies; the dark frown on Goneril's brow, Lear likens to a frontlet.

Gasted means *terrified* and is derived from an old Gothic root; it is cognate with ghastly and aghast.

Thou zed. The letter 'zed' is almost unnecessary and so the expression means 'thou worthless one.'

Those pelican daughters—i.e. daughters whose conduct is like that of the young pelicans which feed on their parents' blood.

To scant my sizes. Size means an allowance—the term 'sizar still being used at Cambridge for a poor student to whom the college makes an allowance. To scant is to diminish.

Warping on the eastern wind—meaning 'moving up and down as locusts move.'

Tartarean sulphur = the sulphur or brimstone of Tartarus the classical name of Hell.

Ambrosial odours—'Ambrosia' in heathern mythology was the food of the gods. Thus the passage means 'the perfumes of heaven.'

Paramount = the chief or head, and is applied by Milton to Satan. Derived from per ad montem.

Serbonian Bog—the name of a lake between Egypt and Palestine.

3. State the circumstances under which the following passages occur, and explain three of them :—

(*a*) Yon cataracts and hurricanoes, spout
Till you have drench'd our steeples, drown'd the cocks.

(*b*) Full oft 'tis seen,
Our means secure us, and our mere defects
Prove our commodities.

(*c*) With these in troop
Came Ashtoreth.

(*d*) The Stygian council thus dissolved.

3. (*a*)—These words are uttered by Lear when on the heath after his expulsion by his daughters. He challenges the winds to blow and the rain to pour down till the world is flooded above the weather-cocks on the tops of the church steeples.

Hurricano is the Spanish form of the word which had not then been anglicised.

(*b*) This is uttered by Gloucester on his way to Dover when led by the old man.

He means—Very frequently it happens that in a moderate condition of fortune we are free from those temptations to which the wealthy are exposed, and thus our wants are really blessings.

(*c*) This passage occurs in the account of the assembling of the chiefs at Pandemonium.

Meaning :—Ashtoreth came in company with these.

(*d*) This passage occurs in the middle of the Second Book of Paradise Lost.

The Stygian council is the Senate of the Chiefs of Hell here named after the River Styx one of the rivers of hell.

Council is in the Nom. Absolute.

4. Comment briefly on the following—(*a*) discoursing wits (*b*) wild justice (*c*) dissimulation (*d*) the master of superstition is the people (*e*) occasion turneth a bald noddle (*f*) Dryden may be properly considered as the father of English criticism.

4. (*a*) Discursive or rambling intellects. Discoursing comes from the same root as discursive Lat. *dis*, apart, and *curro*, I run. Wits from *witan*, to know. (*b*) The means of obtaining one's rights where there is no law to appeal to as in civilised communities. (*c*) *Dissimulation* is the art of concealing one's views or intentions with a view to deceive. (*e*) A bald head being a large smooth sphere is difficult to clasp with the hand. Bacon says therefore that a lost opportunity is as difficult to regain as a bald head is to grasp with one hand. (*f*) Dryden possessed the critical faculty in a high degree and his style of criticism was imitated and emulated by his successors, *e.g.*, Pope wrote an 'Essay on Criticism.' In his Absolom and Achitophel, for example, he criticised most of his literary contemporaries. Hitherto critical treatises were hardly known, the only criticisms appearing in the prefaces of books.

5. 'Amid the awful, the over-powering interest of the story, amid the terrible convulsions of passion and suffering, and pictures of moral and physical wretchedness, which harrow up the soul, the tender influence of Cordelia, like that of a celestial visitant, is felt and acknowledged without being quite understood.'

Name as briefly as you can, and without quotation, some principal features in Cordelia's character, to illustrate this criticism.

5. A kind of sullenness caused by a feeling of inability and indisposition to enter into an unworthy competition of flattery with her sisters. Some persons equally honest would have referred to the sisters' flattery. She is gentle and quiet in her demeanour; simple and honest, able to read character, yet lacking tact and foresight in her invasion of England. Most filial and tender when her pride was not touched, pure, guileless, and pitiful.

6. Give briefly the augument of the second book of Paradise Lost, to the end of the 'great consult.'

6. The book opens with Satan 'high on a throne of royal state,' addressing the assembled 'Deities of Heaven' as he calls them; he discusses the advisability of venturing on a second battle with the Almighty. Moloch next addresses the assembly, counselling open war and deprecating wiles and strategy. Belial followed and recommended no war of any kind, trusting that if they did not rouse the Almighty's anger their fate would be mitigated or they would become inured to their sufferings, their present state at last becoming their element. Mammon follows and argues that they could not endure pardon for shame would cover them in the Almighty's presence. He advocates the illumination of Hell with precious stones and making the best of their present circumstances. Then Beelzebub the next in power to Satan speaks, and ridiculing the baseness of his two predecessors, councils an attack upon the new world just created and inhabited by creatures called men. Satan at length declares his willingness to explore the universe to find this world and then the council is dissolved.

7. Analyse briefly Bacon's Essay on Revenge, *or* on Dispatch.

7. Affected Dispatch, *i.e.* haste, is the enemy of business, just as hasty digestion is injurious to health. The only true measure of dispatch is the amount of business done. Many begin a great deal of business but never perfect it, as some speakers make false periods in speech. Business is dearly bought where the dispatch is small. To facilitate business instruct your informant first as to the lines upon which he is to speak and then do not interrupt him till he has finished, otherwise the examiner is more troublesome than the examinee.

It is well to keep the point under discussion well before the minds of the committee. Elaborate and ornamental speech is opposed to dispatch, except where some prejudice in one's hearers has to be overcome. The arrangement of one's subject under heads, provided the distribution is not too subtle, gives clearness and dispatch. The careful selection of one's opportunity for introducing one's business is a great help. Business has three stages; 1st, the preparation of the matter for the meeting; 2nd, its discussion at the meeting; 3rd, the carrying of it into execution. For there to be dispatch, the business must be proceeded with according to a written agenda.

8. Name six of Pope's greatest poems, and refer briefly to Johnson's criticism of one of them.

8. (1) The Rape of the Lock; (2) The Essay on Man (in 4 Epistles); (3) The Dunciad (in 4 books); (4) Translation of the Iliad; (5) Epistle to Dr. Arbuthnot; (6) Epistle of Eloisa to Abelard.

Johnson tells us that 'The Rape of the Lock' was written to heal a quarrel occasioned by Lord Petre cutting off a lock of Mrs Arabella Fermor's hair. He describes it as the 'most airy, the most ingenious, and the most delightful, of all his compositions.' The poem was published first in a rough form, and Addison has been charged with jealousy for trying to induce Pope to abstain from revising it by calling it 'a delicious little thing.' Pope however revised it and of this improved form Johnson says 'it stands forward, in the classes of literature, as the most exquisite example of ludicrous poetry.' Pope, says Johnson, could never afterwards produce anything of such unexampled excellence, which was such as to make it independent of criticism however adverse.

Female Candidates.

Grammar.

1. Paraphrase the following passage, and explain the connection in which it stands.

A.

Adam.

But do not so. I have five hundred crowns,
The thrifty hire I saved under your father,
Which I did store, to be my foster-nurse,
When service should in my old limbs lie lame,
And *unregarded* age in corners thrown;
Take that: and He that doth the ravens feed,
Yea, *providently* caters for the sparrow,
Be comfort to my age! Here is the gold;
All this I give you: Let me be your servant;
Though I look old, yet am I strong and lusty:
For in my youth I never did apply
Hot and *rebellious* liquors in my blood:
Nor did not with unbashful forehead woo
The means of weakness and *debility:*
Therefore my age is as a lusty winter,
Frosty but *kindly;* let me go with you;
I'll do the service of a younger man
In all your business and necessities.

Orlando.

O good old man; how well in thee appears
The constant service of the *antique* world,
When service sweat for *duty*, not for *meed!*
Thou art not for the *fashion* of these times,
Where none will sweat, but for promotion;
And having that, do choke their service up
Even with the having: it is not so with thee.

Paraphrase A.

Pray don't do that. While in your father's service I have laid by from the wages I received for my work, £120, to keep me when old age should incapacitate me for toil, and I should be discarded as useless lumber. Accept the whole of it—here it is, and he who so tenderly provides for his dumb creatures will never let me want. Take me into your service, for despite my looks, I still retain health and strength; for my mind has never been heated to madness by strong drink, nor my constitution undermined by shameful licence. My old age then resembles a healthy winter, which is bracing despite its severity. Take me with you then, and I will conduct your affairs and minister to your needs with all the ability and alacrity of a man in his prime.

Orlando. My good old friend, you are an excellent type of the devoted servants of ancient times who gave their service as a due to their masters, looking for no pay. You ill suit these base times, when duty enters not into the minds of servants, whose only aim is self-advancement, which, once attained, speedily terminates their devotion. How unlike your conduct is that.

Connection.—Orlando arrives at the house of his brother Oliver, but is met at the door by Adam, the old servant of Orlando's father, Sir Rowland de Boys. Adam warns him of his brother's intention to burn the house and thus destroy him, and then, in the words of the above passage, offers his services.

Paraphrase the following passage, and explain the connection in which it stands :—

B.

Orlando.

But forbear I say ;
He dies that touches any of this fruit
Till I and my affairs are answered.

Jacques.

An you will not be answered with *reason*, I must die.

Duke.

What would you have? Your *gentleness* shall force,
More than your force move us to gentleness.

Orlando.

I almost die for food, and let me have it.

Duke.

Sit down and feed, and welcome to our table.

Orlando.

Speak you so gently ? Pardon me, I pray you ;
I thought that all things had been *savage* here ;
And therefore put I on the countenance
Of stern commandment. But whate'er you are,
That in this desert *inaccessible*,
Under the shade of *melancholy* boughs,
Lose and neglect the creeping hours of time ;
If ever you have looked on better days ;
If ever been where bells have *knoll'd* to church ;
If ever sat at any good man's feast,
If ever from your eyelids wiped a tear,
And know what 'tis to pity and be pitied,
Let gentleness my strong *enforcement* be—
In the which hope, I blush, and hide my sword.

Paraphrase B.

Orlando. Refrain, I repeat, from this food ; for I will assuredly slay him who attempts to partake of it till my demand is satisfied.

Jacques. If reasons (a pun referring to raisins) are insufficient to satisfy you, I shall perish.

Duke S. What is it you want ? You are more likely to obtain your wants by civility than to overawe us by violence.

Orlando. I am perishing from hunger, so pray give me food.

Duke S. Be seated : you are welcome to share this spread with us.

Orlando. Your courtesy moves me to shame. Forgive me, for I expected to find everyone barbarous here, and hence assumed my commanding manner. But whoever you may be thus living in this gloomy and remote forest, regardless of the silent rush of time, I beg you if you have ever seen more prosperous times, and joined your fellow men in public prayer, and eaten at the festive board of the good, and shown and received compassion, to let courtesy alone support my request ; and in anticipating your favourable reply, I apologise with shame for my rough intrusion, and herewith sheathe my sword.

Explanation of connection. Adam and Orlando in their wanderings reach a forest where the former faints from want and exposure. Orlando goes in search of food, and comes across the exiled Duke and company about to feast. Orlando then forbids them to touch the food in the words of the above passage.

Question 1. Trace the origin and give the exact meaning of the words printed in italics in the above extracts.

Unregarded means discarded here. Originally it meant 'not watched or looked at.' Fr. *regarder*, to look at. O. Germ. *warten*, to watch.

providently means 'by foresight and anticipation.' Lat. *pro*, before, and *video*, I see.

rebellious here means 'causing rebellion or violence.' Fr. *rebelle*. Lat. *re*, again ; and *bellum*, war. Therefore literally 'warring back.'

debility = 'weakness.' Lat. *debilitas*, weakness ; Lat. *debilis* (*i.e.*, *de habilis*), unable.

kindly = 'favourable, or well-disposed.' A.-S. *cynde*, natural, innate.

antique = 'ancient.' Lat. *antiquus ; ante*, before.

duty = 'sense of right ;' literally, that which is owing. Fr. *du*, p.p. of *devoir*, to owe. Lat. *debere*, to owe.

meed = 'reward. A.-S. *med*, reward ; originally the word meant 'that which is set by measure.'

fashion = 'custom.' Literally, shape. O. F. *faceon*, shape. Lat. *factionem*, acc. of *factio—factus*, p.p. of *facio*, I make.

an = 'if.' In early English *an* and *and* were the same word. Some connect '*an*' with the old A.-S. verb *unnan*, to grant ; but it is more probably the Scandinavian conjunction '*an*.'

reason. In the passage there is a pun on this word between reason and raisin. Reason is derived from Fr. *raison*. Lat. *rationem*, acc. of *ratio—ratus*, p. p. of *reor*, I think. Thus literally reason = thought.

gentleness = 'courtesy, civility.' Literally it = 'the conduct of those of high birth.' Lat. *gens*, a family. Lat. *gigno*, I bear.

savage = 'wild, uncivilized.' Literally 'rustic, or pertaining to the woods.' Fr. *sauvage*. Lat. *silvestris—silva*, a wood.

inaccessible = 'difficult to get at, or approach.' Literally 'not get-at-able.' Lat. *in*, not ; *ad*, to ; *cedo*, I go.

melancholy = 'sad, gloomy.' Lat. 'with the black bile predominating.' Grk. *melas*, black ; and *cholē*, bile. Melancholia was one of the four humours which were in old times supposed to combine to form the constitution.

knoll'd = 'summoned by ringing.' A.-S. *cnyl*, a knell, or sound of a bell. The word knell has now come to be limited almost entirely to the ringing of the bell before death.

2. What is the character assigned to Jacques in this play ? Illustrate your answer by quotations.

Answ. 2. Jacques is one of the lords attending the banished Duke in his exile ; his melancholy has a very comical side, and cheers and enlivens the party of exiles. He moralizes upon everything, as in the passage 'All the world's a stage,' &c. He is scholarly in his wit, as is shown in his description of his melancholy to Rosalind, where he says 'I have neither the scholar's melancholy, &c., but it is a melancholy of my own.' His melancholy makes him very unceremonious ; *e. g.*, he tells Orlando, who thanks him for his company, 'I had as lief have been myself alone.' And on being told of the name of Orlando's love, he says 'I do not like her name,' and adds 'The worst fault you have is to be in love.' His pleasure in adverse circumstances is shown by his determination to go to the abdicated usurper,

'To him will I ; out of these convenites,
There is much matter to be heard and learned.'

He is an evil prophet, and takes his farewell by prophesying to Touchstone that his 'loving voyage is but for two months victualled.'

3. In what group of Shakespeare's plays is 'As You Like it' to be placed ? Say at what time it was written ; and what other play of Shakespeare's belongs to the same period, or possesses any of the same general characteristics.

Ans. This drama is to be placed among the *Comedies* of Shakespeare. It was written probably in the year 1599 or 1600. The Globe Theatre was opened in 1599, and had the inscription, 'Totus mundus agit histrionem.' It is supposed that this play, with the famous words 'All the world's a stage,' was acted here shortly after the opening of that theatre.

The Comedy of 'Much Ado about Nothing' was written about the same time. The 'Tempest' possesses many of the characteristics of this play. *E.g.*, Prospero is driven from his state by his brother who usurps his dukedom, and Gonzalo answers the same purpose as Jacques in this play.

4. Can you recall any words, phrases or grammatical forms which are employed by Shakespeare in this play, and which are now obsolete ?

Ans. Reynish, coarse, rough ; *quail*, slacken ; *knoll'd*, knelled ; *bob*, rap ; *squandering*, random ; *sans*, without ; *poke*, pocket ; *moe*, more ; *carlot*, clown ; *exterminel*, exterminated. *Bravery*, finery, &c. *Come your ways ; Of what kind should this cock come of ; thrifty hire* = hire of thrift ; *I cannot go no further ; too late a week, i. e.*, by a week ; *more worthier ; make an extent upon ;* and whistles in *his* sound (here his = its), &c.

5. Give examples of any striking metaphors or similes which occur in this play. Explain how you distinguish between a metaphor and a simile, and what purpose these figures serve in composition.

Ans. Similes. The whining school-boy creeping *like snail* unwillingly to school.

Sweet are the uses of adversity, which, like the toad, ugly and venomous, wears a precious jewel in his head.

My age is as a lusty winter, frosty but kindly.

Metaphors. 'All the world's a stage, and all the men and women merely players.'

'Doth it not flow as hugely as the sea
Till that the wearer's very means do ebb?'
'Pacing the forest,
Chewing the food of sweet and bitter fancy.'
'And having that, do choke their service up
Even with the having.'

A simile is a figure of speech in which the relations existing between one set of objects is compared to that existing between another set.

E. g. As a knife cuts through anything, so the bird passes through the air.

A metaphor is a *compressed simile*, or a figure in which the relation between one set of objects is transferred to another, as The bird cuts the air.

The use of these figures is to abbreviate speech, and add to the beauty and expressiveness of language. A great part of our language consists of metaphors plainly expressed or implied. *E. g.*—

'A thought has just struck me.'
'My writing does not come up to yours.'

Female Candidates.

Geography.

1. Draw a map of Ireland, Cape Colony, or India.

2. Arrange six of the most important British Colonies and Dependencies in the order of their size; and give as nearly as you can the population of each.

British Possession.	Area in sq. miles.	Population.
1. Canada (Dominion of) ...	3,205,344 ...	3,178,096
2. Australia	2,947,000 ...	2,065,000
3. India (our States only) ...	1,145,794 ...	210,617,275
4. Farther India (inc. Burmah)	291,701 ...	7,097,150
5. New Zealand	100,000 ...	345,000
6. West Indies	92,821 ...	4,313,400

3. Say what you know of the Hudson's Bay Company, and of the East India Company,

(a) *The Hudson's Bay Company* received its Royal charter in 1670, Prince Rupert being the first governor. Its object was to discover a new passage to the South Sea, and open up the resources of the north of America. Their charter granted them in perpetuity the sole trade of all the coast that lay within the entrance of Hudson Straits. The company founded several *forts*, or trading stations, at which trade in furs, oils, &c., is transacted with the Indians, who bring these goods in exchange for blankets, knives, &c. A joint-stock company was formed and the trade carried on under the direction of a governor and committee of management. In 1783 the North-West Company, availing themselves of the fact that the charter had not been confirmed by Act of Parliament, set up a rival trade, but in 1821 the companies united, and since then trade has been peacefully conducted. In 1825 the Government granted for 21 years the monopoly of trade to the company, extending over 28° of latitude and 75° of longitude. Gradually however the license has been withdrawn from the company. The fur-hunting was opposed to agriculture and civilisation, and consequently in 1868 an Act was passed enabling the Crown to obtain territory from the Hudson's Bay Company and add it to that of the Dominion of Canada. In 1870 the transfer to Canada was made on the following terms:—(1) Canada to pay £300,000 to the company; (2) Hudson's Bay Company to surrender to her Majesty all rights of government, property, &c., in British North America; (3) the company to have the right to claim 50,000 acres of land round each of their stations; (4) That the company may claim $\frac{1}{20}$th of any fertile land laid out for settlement; (5) the company to carry on its trade without hindrance, or exceptional tax.

(b) *The East India Company* began with a few private subscriptions, but gradually became a gigantic commercial scheme, ultimately assuming sovereign power. It was started in 1599 with a capital of £30,000, divided into 101 shares. Its charter in 1600 constituted the shareholders a corporation for 15 years, with the title of 'The Governor and Company of Merchants of London trading to the East Indies.' This charter was subsequently extended indefinitely, but the Government reserved the right to dissolve the corporation at three years' notice. Power of life and death was granted them over their servants and subjects abroad. In 1652 the Mogul granted the company license to trade in Bengal without payment of duties. An Act of Queen Anne's reign gave the company exclusive trading powers to the East, and this lasted till 1813, when much of their trade was thrown open to competition by private merchants. Under the auspices of this company much territory in India and the East was annexed to this country. In 1858 an Act was passed investing the political power entirely in the hands of the British Sovereign and her ministers. In 1874 the corporation was entirely dissolved, the dividends ceasing to be paid, the shareholders receiving Government securities by way of commutation.

4. Describe a journey by the Canadian Pacific Railway.

Starting from Quebec we pass along the banks of the St. Lawrence to Montreal, where we quit the river and proceed to Ottawa, the capital of Canada. The railway then proceeds through a vast thickly-wooded region, the inhabitants of which are engaged in felling the trees and floating them down the tributaries of the St. Lawrence. At length we touch the northern shores of Lake Superior, the largest fresh water lake in the world, and on its waters we see the signs of great trade. Leaving the lake we plunge into a region of land known as the 'fertile belt,' along which the railway is constructed. The Manitoba State strikes us as one great cornfield, some of the finest wheat crops being obtained from this district. Proceeding along the valley of the Saskatchewan we pass through boundless prairies covered by long coarse grass, and see here and there herds of buffalos grazing, but little sign of human life. At length we begin to ascend a gradual acclivity, and for hundreds of miles we feel ourselves rising from the level plain through which we have been passing. This is the slope of the Rocky Mountains. At length we reach the high point of the pass through which the railway proceeds. We now descend by a series of terraces beautifully wooded, and through the wildest scenery, towards the Pacific. Arriving at the valley of the Frazer in British Columbia we proceed again along comparatively level country to New Westminster, where we end what has been a long romantic ride across a huge continent.

5. Give some particulars respecting the first exploration of Australia, and our earliest settlements in that island.

Although Australia was seen by Torres in 1605 it was not till the middle of the 18th century that the English discoveries were important. Captain Cook explored and surveyed the eastern coast of Australia from Cape Howe to Cape York, calling the territory New South Wales. A colony was established here, and then other parts of the coast were explored. In 1798 Bass discovered that a Strait separated Tasmania from the southern portion of Australia. Grant, Bass, and Flinders, under English auspices explored nearly all the rest of the coast. After the establishment of Fort Jackson in 1788, settlers went inland but could not cross the precipitous summits of a mountain range that runs near and parallel to the coast. This was at last done in 1813, and in 1817 the Lachlan was traced to an inland marshy region with a lake in the middle; in 1818 the Macquarie was found to lead to the same marsh. In 1824 Messrs. Howell and Hume traced several large rivers which flowed into the Murrumbidgee. In 1830 Captain Burt explored the Murrumbidgee and the Hume Rivers. In 1846 Dr. Leichardt travelled inland from New South Wales to the Gulf of Carpentaria, but setting out the next year to cross from Moreton Bay to Western Australia, he has never since been heard of. Many other voyages of discovery have been made, and all testify to the existence of a vast arid desert in the middle of the continent.

6. Ulster is characterised by greater commercial prosperity, loyalty to the British Government, and the prevalence of the Protestant religion. The insurrections of the Irish chieftains of Ulster in 1607 led to extensive forfeitures in the counties composing Ulster. These lands were bestowed on English or Scotch colonists, called 'servitors in Ireland,' or on natives of Ireland who were to be made freeholders, all termed 'undertakers,' to whom were severally assigned lots of 1,000, 1,500, and 2,000 acres, on condition that on the largest lots a castle surrounded by a green, and on the other lots a brick or stone edifice, should be built. The English and Scotch colonists had to settle tenants of English or Scotch birth on these lands. By this infusion of English and Scotch blood we see that the Celtic race is not so pure in Ulster as elsewhere in Ireland; the Teutonic blood accounts for the greater enterprise, and the religious traditions of their ancestors and the benefits the latter received from the English, account for the other two characteristics.

7. Give a sketch of a lesson to an upper class of scholars, on the forms and uses of vapour.

Place a saucer full of water on the window ledge one evening and look at it the next morning. Some of the water has gone. Where has it gone? We say it has evaporated; that is, gone away in the form of *vapour*. Had you watched the saucer all the time you could not have seen it go. Thus we have—

I. The invisible form of vapour.

The air is like a sponge; it can hold a certain quantity of vapour; when it can hold no more invisibly it is said to be saturated.

Now *heat* expands air, and increases its capacity for moisture, but cold *contracts* it, and diminishes that capacity.

Thus if the air is saturated and we get a cold wind some of the moisture becomes visible and condensed, and we call it—

II. Fog or mist, or a visible form of vapour.

When warm saturated air ascends into high cold regions of the atmosphere the process just described occurs, and we see the fog in the distance above us. This we call—

III. Clouds.

If I boil water in a kettle, after a while we see something coming out at the spout. This is invisible inside the kettle, but the colder air outside condenses the *vapour* as it passes from the heated water and gives us—

IV. Steam or hot vapour.

Uses of Vapour. I. Provides rain and dew, without which no animal nor vegetable life could exist. Rivers, springs, too, are thus fed.

II. Modifies the heat of the sun, and prevents its too rapid radiation.

III. As steam it is the mightiest force man commands.

8. Name the principal animals to be found in the torrid, the temperate, and the frigid zones respectively, and say what circumstances account for their geographical distribution.

Animals are dependent upon *climate* and *food*, and thus are restricted in their habitats. Within the Tropics on the Torrid Zone animal life is most exuberant in point of size, number, strength and beauty. The Temperate Zones excel the Arctic and Antarctic in these particulars, with the exception of marine animals and sea-fowl, which are most abundant in the Polar regions or Frigid Zones.

The chief animals in the

Torrid Zones are the lion, tiger, elephant, rhinoceros, hippopotamus, crocodile, turtle, boa, ostrich, flamingo, peacock, parrot, humming-bird, giraffe, zebra, apes and monkeys, mosquitoes, locusts, termites, white ants, &c.

Temperate Zones: Ox, bison, horse, buffalo, goat, sheep, ass, deer, camel, wild boar, wolf, fox, beaver, eagle, turkey, goose, grouse, pheasant, &c.

Frigid Zones: Reindeer, musk-ox, brown and polar bears, Arctic fox, and numerous fur-bearing animals; the whale, walrus, and seal. Reptiles are unknown.

9. Say what you know of any six of these places: Ottawa, Christchurch, Limerick, Braemar, Ballarat, the Bahamas, Montreal, Natal, Upper Burmah, Benares, and Aden.

Ottawa is the capital and seat of government of the Dominion of Canada, it is situated on the right bank of a river of the same name flowing into the St. Lawrence. Near it is the splendid cataract of the Chaudière Falls.

Montreal (120,000) is the largest city of Canada. It has extensive trade and manufactures, and from it the magnificent Victoria tubular bridge carries the Grand Trunk Railway across the St. Lawrence, which is two miles wide at this point.

Christchurch is the chief town of Canterbury in the South Island of New Zealand; it exports wheat, meat, and wool.

Limerick, the chief town of the county of Limerick, in the south-west of Ireland. It possesses considerable manufactures.

Braemar is situate in Aberdeen, in the valley of the Dee; it is the castle town of Balmoral Castle, the favourite Scottish residence of the Queen.

Ballarat is a town of Victoria, in Australia, and owed its rapid rise to the finding of gold in its vicinity.

The Bahamas constitute a portion of the West Indies, and were the first land discovered by Columbus. They consist of several low-lying islands, of which only a few are inhabited. They yield dye-woods, salt and turtles. Nassau, the capital, is on Providence Island.

Natal, about half the size of Scotland, is situated to the north-east of Cape Colony. Its surface is diversified by diverging spurs of hills from the Drakenburg Mountains: agriculture forms the staple industry. Cattle, sheep, horses, sugar, coffee, wheat, oats and maize are produced.

Upper Burmah, or Arakan, extends from the Yoma mountains to the coast of the Bay of Bengal. Near the coast the climate is unhealthy. The staple product is rice. The old capital is Arakan, and the chief port is Akyab. The richest province of British Burmah is Pegu, constituting the delta of the Irrawady. Teak and rice are the chief produce.

Benares, on the Ganges, is the sacred city of the Hindoos, who make pilgrimage to it in great numbers.

Aden, an important coaling station on the south of Arabia and near the entrance to the Red Sea, is of great service to steamers on the route to India *via* the Suez Canal.

10. Give some particulars respecting Jamaica, its climate, industry, and resources, and the circumstances in which we acquired it.

Jamaica is the most important of our West Indian possessions, with a length of 140 miles. It is traversed from east to west by the Blue Mountains, with a height of 7,335 feet, and which gave variety to the climate of the island. Thus while at the coast the temperature is tropical and unhealthy, as we pass inland we find gradations in temperature, till on the sides of the hills the temperature is very moderate. Snow has never been seen there. The cultivation of the sugar cane is the chief employment, and rum and molasses are exported as the produce of this industry. Allspice, coffee, dyewoods, tobacco and mahogany are also produced and exported. Horses, mules, goats, sheep, and most kinds of poultry are reared. The Cinchona plant and cocoa trees have been introduced during the last 20 years, and do exceedingly well. The value of the imports in 1869 was £1,224,414; and of the exports £1,162,769. The richness of the soil, however, is such that properly worked it would enable her to produce three times as much as she now does.

Discovered in 1494 by Christopher Columbus, it was settled by the Spaniards in 1510. In 1655 it was taken from the Spaniards by the English. Cromwell retained the old animosity against Spain, as being the main support of Catholicism, and sent out his fleet under Blake to intercept their treasure ships, and break the monopoly of Spanish possessions in Central America. Blake failed to intercept the treasure ships, but took Jamaica from the enemy.

11. Trace by means of description the course of the St. Lawrence.

The St. Lawrence takes its rise in the great fresh water lakes, viz., Superior, Michigan, Huron, Erie, and Ontario, which separate the Dominion of Canada from the United States. Between the last two of these lakes are the great falls of the Niagara, as the stream is called that connects these two lakes. Near the town of Kingston on the north-east coast of Lake Ontario the St. Lawrence issues, a mighty river, with what are known as the 1000 isles of St. George dividing up its course. The river then flows in a general north-westerly direction. Passing the important towns of Brockville, Prescott and Cornwall we reach the confluence of the Ottawa, which joins the river on the left bank. On this tributary is Ottawa, the seat of government of the Dominion of Canada. A little farther on is Montreal, situated on a large island in the stream, and which is the most important commercial town in Canada. The Victoria tubular bridge connects it with the mainland. Passing on, the Richelieu, which drains Lake Champlain, joins the St. Lawrence on the right bank; passing the mouth of the St. Francis, on the right bank, we come to Three Rivers, an important town in the lumber trade, at the mouth of the Maurice. We next arrive at the famous town of Quebec, in whose capture Wolfe fell; this is opposite the confluence of the Chaudière, which drains Lower Quebec. The river now broadens into a magnificent estuary, along whose banks are a number of small trading stations. At the mouth of the estuary is Anticosti Island, at Cape Gaspé, opposite to which the Gulf of St. Lawrence begins. The river St. Lawrence, during the greater part of the year, is navigable for 600 miles, from the sea to Montreal; but beyond this town the prevalence of falls and islands renders navigation impossible for large craft.

12. Who are the Parsees, the Hindoos, the Maories, the North American Indians, and the Zulus respectively.

The *Parsees* are the people of *Pars*, the ancient name of Persia. They are fire-worshippers, and have been driven by the Mohammedans from Persia into India. The chief points in

their creed are—(*a*) the immortality of souls; (*b*) the existence of two distinct personages representing good and evil principles; (*c*) Heaven and Hell; (*d*) two intellects, spiritual and bodily; (*e*) a day of general resurrection; (*f*) the fire or 'behrem' represents to them the type of Divinity, and it is preserved near Surat.

The *Hindoos* are the inhabitants of the 'Holy Land,' as they term it, *i.e.*, that part of India between the Vindyah Hills and the Himalayas. They are descended from tribes that formerly inhabited the centre of Asia. Their language is derived from the Sanscrit. They are divided into many castes with fixed occupations. The Hindus have one supreme god, Brahma, and about 330 millions of minor deities. One important tenet of theirs is the transmigration of souls.

The *Maories* are the aboriginal inhabitants of New Zealand. They are brave and warlike, but are diminishing in numbers before the white man.

The *North American Indians* are the descendants of the inhabitants of America when first discovered by Europeans. Their Aztec ancestors had arrived at considerable civilisation, which they themselves have lost. Their chief occupation is hunting.

The *Zulus* are a brave Kaffir race, inhabiting Zululand, which lies to the north of Natal. We went to war with them recently on account of their inroads into Natal.

13. How are the revenues of the Government obtained in India, and what great public works are carried out by the Government in that country?

The following great public works have been undertaken by the Government:—Construction of railways, making of roads, canals and harbours; building civil buildings, court houses, police stations, barracks, fortifications; and the reclamation of land from the sea.

The soil is held by owners who recognise the Government as joint proprietors, and the tax on this land is the most important source of public revenue. The income derived from the opium monopoly is also a great source of Indian revenue. *Salt*, too, brings in about £6,000,000 annually; excise duties on spirits and drugs, and export and import duties make up the rest. There is now no income tax imposed.

14. Reproduce from what you have heard or read, a description of any two of the most famous cities in the distant possessions of Great Britain—their buildings, aspect, site and surroundings.

I. *Calcutta*, the capital city of the Presidency of Bengal, extends for 4½ miles along the eastern bank of the Hooghly River—the great western branch of the Ganges' mouth. At high water the river is about a mile wide, but at low water, opposite the town, is a long series of bare sandbanks. A quay, called the Strand, extends along the bank of the river. In the northern part of the city, inhabited by the native population, the houses are mostly mud huts, and exceedingly unsanitary: but the splendour of the buildings in the English quarter has caused Calcutta to be called 'The City of Palaces.' Beautiful tropical gardens are interspersed among the fine streets and squares. The esplanade is the fashionable resort for driving. Facing this is the Government House, a magnificent structure, with a circular centre and dome, supported by marble columns. The chief of the remaining public buildings are the Indian Museum, the Calcutta University, the Presidency College, the Town-hall, the Courts of Justice, the Mint, the Bank of Bengal, the Union Bank, St. John's Cathedral, Hindoo pagodas, and Mohammedan mosques. Railways run from Calcutta in several directions, and the quay is always lined with ships.

II. *Melbourne*, the capital of Victoria, is situated on the Yarra-yarra River, eight miles from its mouth, at the head of Port Philip. The river has a bar at its mouth, so that the larger ships have to anchor at Hobson's Bay, near the entrance to the harbour. It is the most important commercial city in the southern hemisphere. A fine stone bridge crosses the Yarra-yarra; the streets are straight, regular, wide, and are paved and macadamised. The water-supply is brought a distance of 18 miles in iron pipes from the head of the Plenty River. It is lighted with gas, and has steam railway, and telegraph communication with the chief places in Australia. Melbourne possesses a public library, a mechanics' institute, hospital, Scotch college, a university, a parliament house which cost £400,000 to build, a custom house, and a post-office in Italian style. In the vicinity are St. Kilda and Brighton marine appendages for sea-air, bathing and recreation.

Male Candidates.

Geography.

1. Describe the mountain system in the northern district of Scotland.

Northern Scotland, west and north-west of Glenmore, is principally an elevated table-land, and it is said that not more than a twentieth of the whole region is level. The most conspicuous features are lofty mountains, rugged table-lands, lochs, moors, and morasses. The mountains are known as the *Northern Highlands*. These are chiefly in the counties of Inverness, Ross, Sutherland, and Caithness. The principal summits are *Ben Attow* (4,000 ft.), on the borders of Inverness-shire and Ross-shire; *Ben Dearg* (3,551 ft.), near Lock Broom; *Ben Wyvis* (3,422 ft.), near Cromarty Firth; and *Ben More*, (3,235 ft.), in the south-west of Sutherlandshire. *Ben Clibrick*, about 3,200 feet high, situated not far from the centre of Sutherlandshire, is also an imposing mountain.

2. Describe the course of the river Severn or of the Trent, mentioning the tributaries, the chief towns and the counties through which the river flows.

The river *Severn* rises in Plinlimmon, in *Montgomery*. It then flows in a north-easterly direction through hilly country to Welshpool, near the English border, where it enters the plain and becomes navigable for boats. Its course is now through a fertile valley about twenty miles wide, bordered on each side by hill ranges. It then flows in a south-easterly direction through the counties of *Shropshire* and *Worcester* to *Tewkesbury*, where it turns to the south-west, and flowing through *Gloucestershire*, finally empties itself into the Bristol Channel. On its banks are *Montgomery*, *Shrewsbury*, *Worcester*, and *Gloucester*, the respective county-towns of the counties it flows through. Its *tributaries* are, the *Teme* on its right bank; the *Virnwy*, *Tern*, *Stour* and *Upper Avon* on its left. The last flows through Warwickshire, and falls into the Severn at Tewkesbury. The Wye and Usk enter the estuary of the Severn, and are sometimes regarded as tributaries.

3. Name the chief ports of Ireland, with notes on their manufactures and trade.

The *chief ports of Ireland* are:—

On the North Side—

Coleraine, with exports of grain, butter, linen, whisky and salmon.

Londonderry, a thriving city. It has a valuable salmon fishery, and exports eggs, butter and corn.

On the West Side—

Sligo, having considerable trade.

Galway, the principal town of Connaught, and sometimes called the 'Western Metropolis.' It has an extensive shipping trade, and herring and salmon fisheries.

Limerick, on the Shannon, the fourth town in size. It is celebrated for the manufacture of lace and fishing hooks.

Tralee, with large trade in flour and grain.

On the South Side—

Kinsale, near the mouth of the Bandon, with valuable fisheries.

Queenstown, a port of call, has large trade.

Cork, with an extensive trade in agricultural produce, including grain, butter, hams, and bacon. It carries on several manufactures, particularly those of leather and gloves.

Youghal, at the mouth of the Blackwater.

On the East Side—

Wexford, exporting cattle, poultry, butter and grain.

Wicklow, with exports of copper-ore and agricultural produce.

Kingstown, the port of Dublin, with large trade.

Drogheda, with exports of corn, cattle, and provisions. It also carries on flax and cotton spinning.

Newry, one of the chief ports of Ulster. It is also engaged in the linen manufacture.

Belfast, on the Lagan, an important seaport, regarded as the capital of Ulster, and the 'Manchester' of Ireland. It is the great seat of the linen and cotton manufacture, and it has several other branches of industry.

Carrickfergus; the people are to some extent engaged in the linen and cotton manufactures, but the fisheries are their principal occupation.

4. Give an account of the rise, progress, and present state of the woollen or of the iron manufacture in Great Britain.

The *woollen manufacture* is one of our oldest, for we find that the Anglo-Saxons partially practised the art of cloth making, woollen cloth being made for the Roman Emperors at

Winchester. Edward III. greatly encouraged the weaving of wool, and in his reign the art of weaving cloth was introduced from Flanders; and Thomas Blanket, of Bristol, established looms for weaving the woollen cloths that still bear his name, 1331. The art of dying wool was first made known in England in the reign of James I. In the reign of Charles II., to encourage the woollen trade, a law was made that everyone must be buried in woollen. Under such fostering care the manufacture greatly increased: Anne and George I. also did all they could to encourage it. At the present time, the woollen manufacture is one of the most important in this country. The chief seat of it is in Yorkshire: the principal towns being Leeds, Bradford, Halifax, Wakefield, and Huddersfield. Trowbridge and Bradford, in Wiltshire, and Stroud in Gloucestershire are also engaged in this manufacture.

5. When and under what circumstances was the Punjaub annexed? Mention four towns in it, the rivers (if any) on which they are situated, and some points of interest in their history.

The Punjaub was annexed in 1849 after the second Sikh War. In 1859 it was placed with its dependencies under a Lieutenant-Governor. Of the chief towns may be mentioned—

Peshawur, near the Kyber Pass, an important military station, commanding the entrance to India from Afghanistan. In each of our Afghan wars we have found this town of the utmost value.

Mooltan, on the Jhelum, formerly a strong fortress. It was taken by the British forces in 1849.

Lahore, on the Ravee, the present seat of government. At Meean Meer, a large military cantonment five or six miles from Lahore, was effected the disarming of the native troops, during the Indian Mutiny, as soon as the news of the outbreak at Meerut reached Lahore. In this way the Punjaub was saved.

Umritsur, famous for its manufactures of cotton and silk.

6. What are the chief articles of export from British India to Great Britain? From what parts of India do they respectively come?

The chief *articles of export* from British India to Great Britain are as follows:—

Articles of Export.	From whence obtained.
Mineral Productions—	
Nitre or Saltpetre ...	Bengal.
Borax	Exported from Calcutta; obtained from Tibet.
Vegetable Productions—	
Rice.....	Exported from Calcutta, Arracan, Moulmein, Tavoy.
Cotton.....	Grown in the Doab, the valleys of the Godavery and Toombudra, at Coimbatoor, Tinnevelly, Gujerat, and Chittagong.
Indigo.....	Grown in the valley of the Ganges, between Decca and Delhi.
Sugar.	The whole of India.
Coffee.	Ceylon and Bombay.
Tea.	Assam.
Pepper.	Malabar.
Cinnamon.	Ceylon.
Hemp and Jute.	Bengal.
Linseed.	The whole of India.
Cocoanuts.	Ceylon.
Animal Productions—	
Silk.	The whole of India.
Ivory.	Ceylon chiefly.
Shawls.....	Cashmere.
Wool.	Bombay.

7. How is Cape Colony governed? Is it well suited for agriculture? What minerals are found in the colony? Describe its climate.

Cape Colony possesses a regular constitution. Its Governor is assisted by a Legislative Council, and a House of Assembly. The Governor is appointed by the Crown. The Legislative Council consists of twenty-one members, elected by the Colonists for ten years. The House of Assembly consists of sixty-eight members, who represent the chief towns and country districts of the Colony, and are elected for five years.

Along the South Coast, where rains are frequent, it is very fertile. The Karroos, which are bleak, dry deserts, only want permanent water to make them very rich and productive, as they are generally composed of shallow beds of rich soil. In the rainy season they are covered with a luxuriant vegetation and a splendid flora. The *North-Western part* is of the same character.

The *Minerals* found in the colony are Copper, Gold, and Diamonds. Copper is found in great quantities. Gold is found in Namaqua Land, the Orange River Free State, and on the borders of the Transvaal. Diamonds, in the valleys of the Nu Gariep, Ky Gariep, and Ongar.

The *Climate* is pleasant and healthy, and is well suited to Europeans, the atmosphere being pure, and the heat temperate. The mean annual temperature of the Colony is higher than that of England, and the variations between summer and winter are not so great. Frost and snow are almost unknown except in the very high portions of the country. The chief drawback is the irregularity of the rains, which sometimes fall in torrents, so as to endanger property, and at others are absent for long periods together, hindering agriculture, and inflicting great injuries on the cattle-rearers.

8. What provinces are included in the Dominion of Canada; who determines whether a province shall be admitted into the Dominion or not? Give brief notes of a journey from Halifax to Niagara.

The *Dominion of Canada* includes the provinces of Ontario, Quebec, Nova Scotia, New Brunswick, British Columbia, Vancouver Island, Manitoba, the North-West Territory, and Prince Edward Island.

In the Act passed in 1867 for the Confederation of the two Canadian Provinces, Ontario and Quebec, with Nova Scotia and New Brunswick, provision was made for the admission of any other province of British North America which should desire to follow suit. Newfoundland is the only province which has not yet entered the Dominion; and the Act constituting the Dominion opens the door for the entrance of this latest lingerer outside whenever she may think fit to claim admission.

Leaving Halifax, the capital of Nova Scotia, with its splendid harbour, we sail in a north-easterly direction along the coast until we reach Cape Canso. Rounding this we pass through the Gut of Canso, separating Nova Scotia from Cape Breton Island, Then leaving Northumberland Strait, and Prince Edward Island on our left, we pass the Magdalen Islands on our right, and steer for the mouth of the St. Lawrence. Sailing up this river we pass in succession the mouth of the Saguenay; Quebec, on the St. Charles, the 'Gibraltar' of the continent; the mouth of the Chaudière on the left; Three Rivers, on the right at the mouth of the St. Maurice, which here divides into three portions; the mouths of the St. Francis and Richelieu on the left. About 40 miles farther up the river, we reach Montreal, the largest, handsomest, and most commercial city of Canada, situated on the south-eastern side of an island of the same name. We continue our course, sail through the Lake of the Thousand Isles, and enter Lake Ontario. Crossing to the south-western end of this lake, we reach Niagara, at the mouth of the river Niagara.

9. What is our chief trade with our West Indian Islands? How was trade affected by the emancipation of slaves? Write a short account of Jamaica.

Our chief trade with the West Indian Islands is in Sugar, Rum, Molasses, and Coffee.

Trade was greatly depressed by the emancipation of the slaves, owing to the want of labour, consequent on the relapse of the negroes into idle habits.

Jamaica, the largest of the British West Indian Islands, is the only one of the Greater Antilles belonging to England. It measures about 160 miles in length from E. to W., and has an average breadth of 30—40 miles. A chain of mountains, the Blue Mountains, runs through the country from E. to W. Rivers are abundant, but the only navigable stream is the Black River, which enters the sea on the south-west coast. The climate is hot, and in the low plains, where yellow fever is prevalent, unhealthy. The sugar-cane is the chief production. Jamaica is divided into three counties—Surrey, in the east; Middlesex, in the centre; and Cornwall, in the west. Its chief town is Kingston, on the south coast, with a fine harbour; but Spanish Town, a small and unimportant place, is the seat of Government. Other towns are Falmouth and Montego Bay, on the northern coast. The present state of Jamaica is anything but flourishing, owing to the want of labour. Her roads are

almost impassable, her bridges broken down, and her coffee-plantations gone back to bush. The streets of Kingston are unlevel, unpaved, and unlit. The government is administered by a Governor assisted by a Privy Council and a Legislative Council of twelve members.

10. Describe the principal mountain chain of Australia and its vegetable and animal productions.

The *mountain ranges* of Australia are all on or near the coast. The principal one forms a continuous belt of highland, which runs along the entire eastern coast of the continent from Bass Strait to Torres Strait. It is known by various names in different parts of its course. In Victoria it is called Australian Alps, and further north, in New South Wales, the Blue Mountains. Liverpool Range, a great spur extending for some distance east and west, marks the northern limit of the same Blue Mountains. North of the Liverpool Range it is known as the North Dividing Range. It bifurcates in the south of Queensland, one branch running northwards to Cape York, the other towards the Gulf of Carpentaria.

The *vegetation* of Australia is of strange and unexampled character. There are several entire orders of plants peculiar to the continent, and many families of plants that grow elsewhere here assume new and singular forms. Nearly all the trees are evergreens, the change of seasons producing no apparent influence on the invariable olive-coloured tint of the forests. The timber-trees consist of acacias and eucalypti (wattles and gum-trees). Tree-ferns and nettles of a tree-like growth are common, and palms are found in the interior. The continent produces hardly a single species of native edible fruit or plant capable of yielding a regular supply of food.

The *animal productions* are still more peculiar. The chief characteristics are:—(1) Few species are represented; (2) The individuals representing those species are very scarce; (3) Many of these present great anomalies in form, habits, &c. All the quadrupeds, except the dog and rat, are peculiar to the country. Most of them are marsupials, *i.e.*, they are provided with a bag, in which they carry their delicate young about with them wherever they go. They comprise kangaroos, ring-tailed opossums (phalangers), flying squirrels (petaurists), wombats, bandicoots, and other animals.

11. Where, on what rivers (if any), and for what noted, are the following places:—Aden, Ballarat, Chester, Colombo, Drogheda, Dunedin, Fredericton, Georgetown, New Westminster, Singapore?

Aden, is a seaport and fortress of Arabia, near the entrance to the Red Sea. Its harbour is said to be the finest in Arabia. It was taken in 1839 on account of outrages committed on the crew of a shipwrecked vessel.

Ballarat, is situated West of Melbourne, in Victoria; it is a rising town, and is the centre of a gold-district.

Chester, on the Dee, is the county-town of Cheshire, and a cathedral city. It is almost inclosed by the ancient wall.

Colombo, the capital of Ceylon, is on the West coast, and is a flourishing seaport.

Drogheda, on the Boyne, is one of the chief towns of Louth, in Leinster, Ireland. It was unsuccessfully besieged by the rebels in 1641, and was stormed by Cromwell in 1649.

Dunedin, at the head of Otago Harbour, is the capital of Otago, New Zealand.

Fredericton, the capital of New Brunswick, is situated about eighty miles up the river St. John. It is a clean and pretty town.

Georgetown is the capital of British Guiana, and stands near the mouth of the Demerara.

The capital of Ascension is Georgetown, situated on the N.W. of the island.

Georgetown is a port on the East coast of Prince Edward Island.

New Westminster, on the Frazer, is the capital of British Columbia. It is situated about twenty miles from the mouth of the river.

Singapore is an island lying at the southern extremity of the Malay Peninsula. It resembles the Isle of Wight in shape, and is about one-third as large. It is the great entrepot of South-eastern Asia and the Indian Archipelago.

Explain the term *in italics* in the following passage:—'In the year 1886 there will be a *total eclipse* of the Sun, on August 29th., invisible at Greenwich. Begins at 10h. 19m. a.m. (*Greenwich mean time*), in *long.* 66° 24′ *W.*, and *lat.* 11° 55′ *N.* The *central eclipse* begins at 11h. 14m. a.m., in long 79° 46′ W., and lat. 9° 48′ N.

What part of the British Empire would be a favourable position for *observing this eclipse; what is the object of sending out an 'eclipse expedition'?*

One half the moon's journey is performed above the plane of the ecliptic, one half below it; hence twice in each revolution the moon is in that plane, at those points called the nodes. If the moon at that time be new, that is, between the earth and the sun, then the moon obscures the sun, and we have what is called an eclipse. If the moon be in perigee the sun is completely obscured and we have a *total eclipse.*

In consequence of the motion of the earth not being uniform in its orbit round the sun, the days, as measured by the sun, are not equal in length. Therefore, to establish a convenient and uniform measure of time for civil purposes, our common day is not measured by the *true sun*, as a sundial measures it, but by what is called the *mean* (or average) *sun*. In England, Greenwich being our principal observatory, we use the mean time of Greenwich. (*Greenwich mean time.*)

Longitude is distance measured east or west of a given meridian. In England the meridian passing through Greenwich is used as the starting point, therefore long. 66° 24′ W., means 66° 24′ of longitude West of Greenwich.

Latitude is distance measured north or south of the Equator, therefore lat. 11° 55′ *N.*, means 11° 55′ of latitude north of the Equator.

The *central* or *annular* eclipse begins when the disc of the moon is inside and tangential to the disc of the sun. The moon's disc then travels across that of the sun and at last the centres nearly or quite coincide; then there is a ring (Lat. *annulus*) of the sun's face outside the dark disk of the moon.

The part of the British Empire most favourable for observing this eclipse would be some of the West Indian Islands.

The object of sending out an eclipse expedition is to obtain additional information concerning the sun's atmosphere by observing the corona. The corona reveals to us for the most part the exterior portion of the sun's atmosphere, which is not seen when the sun itself is visible, owing to the overpowering light of the latter.

13. Answer either (*a*) or (*b*)—

(*a*) An advanced class is reading Froude's 'Oceana' Give such notes and explanations as you would think necessary on the following passage:—'In the North Island only should we have a chance of seeing anything of the Maori; and though Wellington was the seat of government, and we should miss the Governor and his political surroundings, we determined to take Auckland as our head quarters, and make excursions from it into the interior. In this way we could secure a sight of the hot springs and geysers, and other natural curiosities.'

(*b*) Prepare the outline of a lesson to the seventh standard on *tides.*

(*a*) The Maories are not a conquered race, but have voluntarily placed themselves under British rule. No land has ever been acquired from them except by purchase, and in this way two-thirds of the country has become British. The whole of South Island has been transferred in this manner, and the natives having retreated as they sold their land, they are now found only in North Island, and it is there only that land can be acquired from them.

Auckland was formerly the capital, but in 1866 the government was transferred to Wellington.

Three distinct lines of craters occur in North Island; one at the Bay of Islands, one at Auckland, and one from Mount Egmont to White Island, an active volcano in the Bay of Plenty. White Island is so hot that it is dangerous to walk upon it. No craters are known to exist south of Cook Strait. Grand and beautiful geysers ejecting water of 214° Fahr. temperature are found round Lake Rotorua, and Lake Rotomahana, a little further south. Near this latter lake were formerly beautiful terraces formed of the siliceous material deposited by the geysers, but these were lately destroyed by an eruption.

Male Candidates.

SECOND YEAR.

Three hours allowed for this Paper.

(Not more than *eight* questions to be answered.)

Euclid.

N.B.—Capital letters (excluding A, B, C, D, E, F), not numbers, must be used in the diagrams.

The only signs allowed are + and =. The square on PQ may be written 'sq. on PQ,' and the rectangle contained by PQ, and RS, 'rect. PQ, RS.' Other abbreviations, if employed, must not be ambiguous.

1. If two triangles have two sides of the one equal to two sides of the other, each to each, but the angle contained by the two sides of one of them greater than the angle contained by the two sides equal to them, of the other; the base of that which has the greater angle shall be greater than the base of the other.

The second triangle being PQR, why is the following condition necessary? 'Of the two sides PQ, PR, let PQ be not greater than PR.'

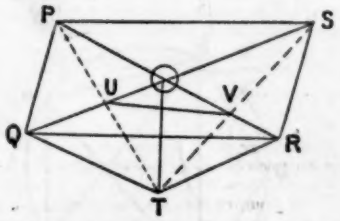
(*a*) Prop. I. 24.

(*b*) This condition was added by Simson; unless it be stated there will be three cases to consider. See Todhunter, Notes p. 260.

2. The opposite sides and angles of a parallelogram are equal to one another, and the diameter bisects it, that is, divides it into two equal parts.

From the angles Q, R of a parallelogram PQRS, QT, RT are drawn parallel to the diagonals, which PT, ST intersect in U, V. Show that UV is half PS.

(*a*) Prop. I. 34.



(*b*) Join TO. Then in the triangles POS, QOR, angle OPS = ORQ and angle PSO = RQO and side PS = QR.

Therefore. OS = OQ, and PO = OR.

I. e., the diagonals of a parallelogram bisect each other (I.).

Then in the parallelogram QORT, QT = OR; and PO = OR.

Therefore, QT = OP.

And because QT, OP are equal and parallel; therefore PQ and OT are equal and parallel.

Therefore POTQ is a parallelogram, and similarly TOSR.

And by (I.) above, QO is bisected at U, and OR is bisected at V. And by a well-known deduction 'the line joining the middle points of the sides of a triangle is parallel to the base and equal to half of it.'

Therefore in the triangle QOR, UV = ½ QR; and QR = PS.

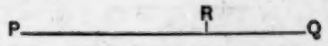
Therefore UV is ½ PS.

[Q. E. D.]

3. To divide a given straight line into two parts, so that the rectangle contained by the whole and one of the parts, shall be equal to the square on the other part.

Show that the squares on the whole line and the smaller part are equal to three times the square on the other part.

(*a*) Prop. II. 11.



(*b*) Let PQ be divided at R, so that rect. PQ.QR = sq. on PR, then sq. on PQ + sq. on RQ = 3 times sq. on PR.

Sq. on PQ = sq. on PR + sq. on RQ + 2 rect. PR.RQ (II. 4.)

Add to each of these the sq. on RQ; then sq. on PQ + sq. on RQ = sq. on PR + (2 sq. on RQ + 2 rect. PR.RQ).

But the sq. on RQ + rect. PR.RQ = rect. PQ.QR. (II. 2.)

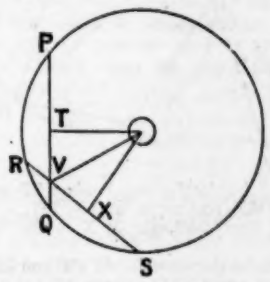
Therefore, sq. on PQ + sq. on RQ = sq. on PR + 2 rect. PQ.QR. = 3 times the sq. on PR.

[Q. E. D.]

4. If a straight line drawn through the centre of a circle bisect a straight line in it which does not pass through the centre, it shall cut it at right angles; and conversely, if it cut it at right angles, it shall bisect it.

PQ, SR are two equal chords of a circle of which O is the centre; prove that the line joining O to the point of intersection of these chords bisects the angle between them.

(*a*) Prop. III. 3.



(*b*) Let the chords intersect at V. Draw OT at right angles to PQ, and OX at right angles to RS; then OT = OX (III. 14.) And in the right-angled triangles OVT, OVX, the sq. on OV = sqs. on OT.TV, and also sqs. on OX.XV.

Therefore, the sq. on VT = sq on VX, and VT = VX.

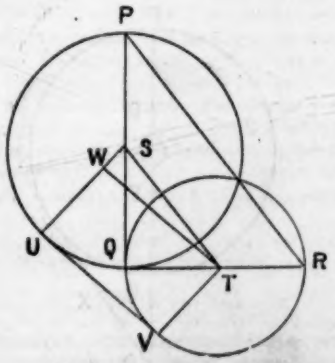
Therefore also, the triangles are equal in all respects, and the angle OVT = angle OVX (I. 8, &c.)

[Q. E. D.]

5. If a straight line touch a circle, the straight line drawn from the centre to the point of contact shall be perpendicular to the line touching the circle.

If the sides of a right-angled triangle, including the right angle, be the diameters of two circles, prove that the square on the part of the common tangent included between its points of contact with the two circles will be equal to the area of the triangle.

(*a*) III. 18.



(*b*) Area = PQ. ½ QR = PQ.QT.
= 2SQ.QT (I.)

By III. 18, SU is parallel to VT: suppose SU greater that VT, and draw TW parallel to UV, then TW = UV, and WS is the difference between SU and TV.

Then sq. on TS = sq. on TW + sq. on WS; = sq. on QS + sq. on QT.

Therefore sq. on TW = sq. on QS + sq. on QT − sq. on WS (II.)

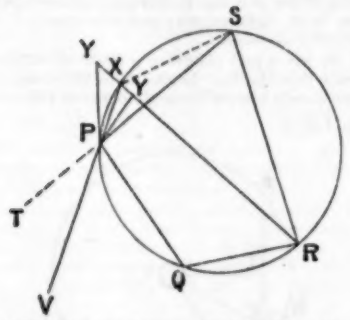
Now sq. on QS = rect. QS, QT + (QS − QT = WS) QS: and sq. on QT = rect. QS.QT − WS.QT; therefore 2 rect. QS.QT = sq. on QS + sq. on QT − [(QS − QW = WS) WS = sq. on WS]; therefore sq. on TW (II.) = 2 rect. QS.QT = area of triangle (I.); therefore sq. on UV = area of triangle.

[Q. E. D.]

6. The opposite angles of any quadrilateral figure inscribed in a circle, are together equal to two right angles.

The lines bisecting any angle of a quadrilateral inscribed in a circle, and the opposite exterior angle, meet in the circumference of the circle.

(*a*) III. 22.



(*b*) Let PQRS be the figure. Produce SP to T, and bisect angle TPQ by VPX, and angle SRQ by RX.

The bisecting lines shall meet at X in the circumference of the circle.

If they do not, let them meet at Y, and join PX, XS.

Then the whole angle TPQ = angle SRQ (I. 13 and III. 22).
Therefore angle TPV = angle SRX.
Therefore angle YPS = angle SRX (I. 15).
But angle XPS = angle SRX (because they are in the same segment (III. 21).

Therefore angle YPS = angle XPS which is absurd.

In the same way it may be shown that VP cannot meet RY at any other point but X. Therefore they meet at X in the circumference, &c.

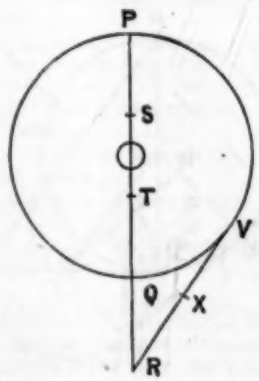
[Q. E. D.]

7. If from any point without a circle two straight lines be drawn, one of which passes through the centre, and the other touches it; the rectangle contained by the whole line which passes through the centre, and the part of it without the circle shall be equal to the square on the line which touches it.

Find a point R in the diameter PQ produced such that the tangent drawn from R is equal to twice QR.

(*a*) III. 36.

(*b*)



Divide PQ into three equal parts, at the points S,T (this may be done by an easy application of VI. 2), and produce PQ to R making QR = TQ.

Draw the tangent RV. RV shall be twice QR.

Then by construction PR = 4RQ.

Therefore rect. PR.RQ = four times sq. on RQ.

Therefore III. 36, sq. on RV = four times sq. on RQ.

Bisect RV at X. Then sq. on RV = sq. on RX + sq. on XV + two rect. RX.XV.

Therefore sq. on RV = four times sq. on RX.

But sq. on RV = four times sq. on RQ; therefore RQ = RX

But RV is twice RX.

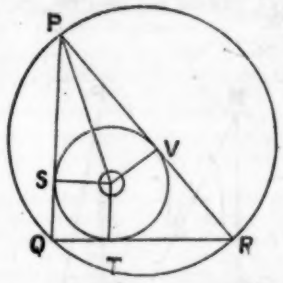
Therefore RV is twice QR.

[Q. E. F.]

8. To describe a circle about a given triangle.

If two circles be described, one about, the other within a right-angled triangle, the sum of their diameters is equal to the sum of the sides containing the right angle.

(*a*) IV. 5.



(*b*) The hypotenuse PR is the diameter of the larger circle, because the angle in a semicircle is a right angle, and OS,OT are together equal to the diameter of the smaller circle.

It is required to prove that PR + OS + OT = PQ + QR.

Join PO: then in the right angled triangles POS, POV, OS = OV.

Therefore, PS = PV, similarly RT = RV.

And by cons. SOTQ is a square; therefore, OT = TQ and OS = SQ.

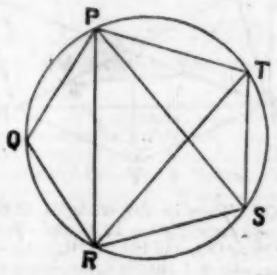
Therefore, PV + RV + OT + OS = PS + RT + TQ + SQ.

Therefore, PR + OT + OS = PQ + QR.

[Q. E. D.]

9. To describe a circle about a given equilateral and equiangular pentagon. If the pentagon be PQRST, show that PR is parallel to ST.

(*a*) IV. 14.



(*b*) Join PS, RT.

Then angle TPS = angle TRS (III. 21),
and angle SPR = angle PRT (III. 27).

Therefore whole angle TPR = whole angle PRS.

And because angle PTS = angle TSR (Hyp.)

Therefore the two angles RPT, PTS are together equal to the two angles PRS, RST.

Therefore the two angles RPT, PTS are together equal to two right angles.

Therefore PR is parallel to ST (I. 28).

[Q. E. D.]

10. When is the first of four magnitudes said to have the same ratio to the second which the third has to the fourth? What is meant by 'homologous sides'?

If a st,aight line be drawn parallel to one of the sides of a triangle, it shall cut the other sides, or these produced, proportionally: and conversely, if the sides, or the sides produced, be cut proportionally, the straight line which joins the points of section shall be parallel to the remaining side of the triangle.

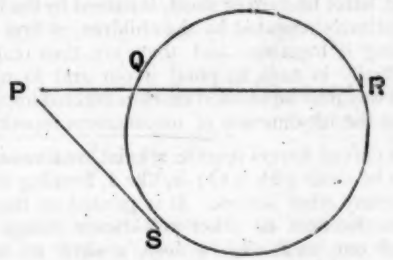
(*a*) See Book V. Definitions Nos. 5 and 12.

(*b*) VI. 2.

11. To find a mean proportional between two given straight lines.

From a point P, outside a circle, a line is drawn cutting the circle at Q and R. Find a mean proportional between PQ and PR.

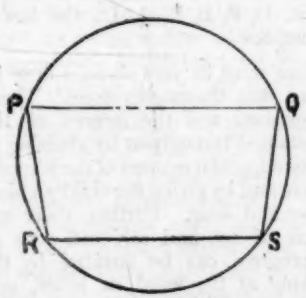
(*a*) VI. 13.



From P draw the tangent PS. Then sq. on PS = rect. PQ.PR ∴ PS is the mean proportional required.

[Q. E. F.]

12. P and Q are fixed points on a given circle; PR, QS are any pair of chords equally inclined to PQ. Show that the *direction* of RS is fixed.



Join PQ, RS.

Then in the quadrilateral PQRS, because angle RPQ = angle SQP (hyp.)

Therefore angle RSQ = angle SRP (III. 22).

Therefore angle RPQ + angle SRP = angle SQP + angle RSQ.

Therefore RPQ + SRP are together equal to two right angles.

Therefore RS is parallel to PQ (I. 28).

And since this demonstration is independent of the value of the angle RPQ, the *direction* of RS is fixed, *i.e.*, RS is always parallel to PQ.

[Q. E. D.]

(To be continued.)

How to teach the Babies.

BY JAMES BAILEY.

Head Master of Southlands Training College.

CHAPTER VII.

'READING.—THE ALPHABET.'

PROBABLY no part of school method has had a greater amount of time and thought devoted to it, a greater variety of suggestions as to how it should be done, or more diversified forms of apparatus devised for carrying it out, than the method of teaching reading. This may be accounted for by reason of the great importance of the power to read, and the difficulty usually felt in acquiring it. First among all subjects of school instruction, because of its value to its possessor; a key whereby to unlock all stores of knowledge; it can scarcely be wondered at, if it should be often mistaken for knowledge itself, instead of being, as it really is, a means for the acquisition of knowledge. Then, too, it forms so easy a test of the progress of the scholar, it lends itself so readily to the work of judging of teacher and taught, that it is often unduly forced, and the attempt is made to press little children on to read far sooner, and to a much greater extent, than is proportionate to their power of understanding what they read.

It is no doubt true that by reason of well adapted methods, or, in other cases, by unwise pressure, even very young children are caused to make progress in the art of reading, more rapidly than would seem to be accordant with the natural growth of skill and knowledge.

Harm is not infrequently done by setting for all schools a standard of attainment in some particular branch of instruction, which is reached in some school or schools where special circumstances in the school, or the class of children, or the teacher, favour its acquirement. A teacher may be doing excellent work in the general education and training of children, whose results, in one or several branches of school work, may fall short of the point reached in some other school. And in such cases much greater harm than good may be done by insisting on the effort to reach this exceptional excellence. No garden, however favourably situated and skilfully tended, can show the highest point of excellence in every flower or fruit contained in it. Some are distinguished above others for the perfection of one class of produce. Others may be able to show superiority to that one in other classes of produce. To insist upon it that every gardener should, in every plant he grows, produce the same perfection in size and colour and form of flower as the best reached in any other garden would be not more unwise than is the attempt sometimes made to force upon every school of a given district a standard of attainment for each subject of instruction, which possibly has been reached in some given school. We may reasonably use the success of others as a stimulus to our best efforts. But if the best be done, we need not be dissatisfied with teacher or with children if we fall short of the standard reached by others. Certainly it does not justify an urging of the children beyond the pace which is natural to them.

Now if this be true of all classes of schools, it is eminently true of the babies' class. There, as elsewhere, we may and ought to use the knowledge we have of the best attainable results, not, be it observed, always and necessarily the 'highest,' so called, to urge an unceasing effort to carry forward the little ones in the best possible way, to the best possible ends.

What has been said has special application to the teaching of reading, in which the temptation to ambitious effort is strong. Some classes of children, of, say, four years of age, are made to show surprising results in this subject. To expect the same results of all classes, is to ensure disappointment, and the effort to get it is to risk an undue strain upon the children, or undue neglect of some other subject of instruction of equal importance to that of reading.

In teaching young children to read it must ever be borne in mind that reading depends on, *first*, the ready recognition of the *forms* of letters and words, and *secondly*, on the interpretation of these forms into their corresponding *sounds*. The first lessons should accordingly be lessons on 'Form.' This is recognised in the furnishing of the common 'Form and Colour box.' An invariable part of its contents is a set of Letters, and Numeral Figures, and rightly so.

The teaching should begin with the capital letters, they are of simpler shapes than the small letters, and therefore more easily recognised, and more easily formed. But let it be noted that the teaching of the Alphabet, though afterwards closely connected with reading, is yet, in its early stages, something quite apart from it. Useful and necessary as is the recognition of the *form*, the name given to each individual letter does but little towards giving the proper *sound* when combined with other letters to form a word. The sound, at this stage, is of no value to the children, as they cannot as yet combine the letters into words, and if they could the individual sounds of the letters would be misleading or at best a very slender help. The name is requisite because the letter is an object for which a name is needed as much as for any other object.

The letters should be taught in the order of the simplicity of their *form*, beginning with I as the easiest, and the form chosen should be that of the plainest of Roman capitals.

The method should comprise the use of a variety of apparatus as blackboard and chalk, short sticks and laths as used in the kindergarten exercises, slate and pencil, letter box, cards with a letter on each, a large and well printed alphabet sheet, &c. Some of the lessons will form suitable and interesting exercises to be classed among the 'varied and appropriate exercises,' now required in every infant school.

Beginning with I, the teacher draws a straight upright stroke on the blackboard; she directs the attention of the children to its *form*, a straight, narrow, upright line. She shows other upright forms, a pencil, a lath, &c. She directs the children, for each of whom there should be at hand a slate and pencil, and a lath or stick, to put their laths in the same position as hers. In such ways as these there is well impressed upon the mind an *idea of the form*. Again directing attention to the stroke upon the board the teacher compares it with the letter I on a card or on the letter sheet. She gives the name of the letter, uttering it with great distinctness, in every such case directing the children's attention to the shape of her mouth while uttering it, and somewhat exaggerating it. The children are then required to pronounce the name in the same way as the teacher did it. They must be carefully observed while doing this, so that imperfect or inaccurate enunciation may be noted and corrected. Great care, too, must be taken to connect the *form* with the sound, as should be done in the case of all other forms, and things brought to the notice of the class. The next letters to be taken, one at a time, should be those composed of *two* straight lines, L, T, V, X. Then follow in succession the letters of *three* and of *four* straight lines, F, H, K, N, Y, Z; E, M, W.

The same processes are repeated with each. The letter is printed by the teacher on the black board, and is formed by the children with their laths. The chalked letter on the board is compared with the printed letter on card or sheet, is named by the teacher, and distinctly repeated by the children, at first all pronouncing it together, and they are then called on individually in turn to point it out and to name it. In this way may be secured much reiterated impression, without the irksomeness of monotonous repetition.

The curved letters require special treatment. The first to be dealt with is O; it, like I, forming the basis of so many other letters. It is printed on the board, and its likeness to other well-known things being pointed out, as a *ring*, a *hoop*, a *circle* of any sort. The letters based on it should then be successively given, and the relation of each to O being shown, thus O, C, G, Q. The distinction between those which are similar in form must be carefully pointed out, and patient care taken at every step to secure a thorough following of the teacher by the class. The letters composed of straight lines and curves combined will be taken next, in a similar order of simplicity of arrangement, D, P, B, R, J, U, the last being the double curve, S.

The lessons must be very short, a little being taken in each, and that thoroughly done. There must be frequent revision, and the interest of the children must be sustained throughout by amusing description, by the animated, genial manner of the teacher, by variety of illustration, and by giving the children plenty to *do*, as well as to *see* and *hear*. Further, there must be the constant use of *eye*, and *ear*, and *voice coincidently*. No good progress can be ensured by the children merely looking at the word or letter, or by merely repeating its name without at the same time looking at it. The eye must recognise the *form*, the ear must recognise the sound, and at the same time the voice must utter what has been thus learned, and the mind, through eye and voice combined, must connect the name with the shape.

The teaching of the small letters of the alphabet will follow a similar process to that of teaching the capitals. The letters will be selected according to their simplicity of form, and especially the ease of pronouncing them. Each one in turn will be printed on the blackboard, pointed out on the letter sheet, or the card shown on which the letter is printed, named by the teacher, and then by the class. Then, too, the capital letter, and the corresponding small letter should be printed, or placed side by side, and the name, common to both, should be again pronounced,

thus Ii, Tt, Aa, Gg, Ss, &c. In this way gradually, with fair speed, and with no undue strain upon bodily or mental faculties, a knowledge of the whole alphabet may be acquired by the little ones. Anything which can make the work attractive, and which is suitable, should be pressed into service. The association of pictures with the letters, which may be made helpful, by likeness of form, or by reason of the letter beginning the name of the thing represented; the formation of the letters with properly shaped cardboard or thin wood; and other expedients which the ingenuity of the teacher may devise, are all of value. And it must not be forgotten throughout that this is but a preliminary to the teaching of reading proper, giving a knowledge of the *individual elements* out of which reading is formed, but yet in itself a distinct though related matter.

(To be continued.)

—o—

Helps to the Study of Shakespeare's 'Hamlet.'

THE play of Hamlet is one of the works appointed this year for Second Year Students in training colleges and Candidates for Certificates to study, as part of their preparation for examination in English. The requirements in this subject include, according to the Syllabus, 'I. Analysis, grammar, and paraphrase of passages from the prescribed play. II. The Language, style and allusions in the prescribed books, and the place of the author in English literature. III. An exercise in composition.' We propose in this and succeeding papers to aid students in the study of 'Hamlet;' not by giving a new annotated edition of the tragedy in monthly instalments, but by endeavouring to guide our readers to the best way of mastering the play, by furnishing such hints and suggestions as may enable them to overcome the difficulties the work presents, and to secure from their reading all the advantages which may be derived from such a work by thoughtful and well-directed efforts.

Complaint is sometimes made that the thorough study of a play or poem for examination purposes is apt to breed disgust and weariness rather than pleasure and admiration, that fine passages being subjected to minute grammatical analysis lose their charm, and the whole work becomes 'stale, flat, and unprofitable.' These complaints are due, we believe, to the fact that the play or poem is often studied as a collection of expressions conforming more or less to certain grammatical rules, rather than as a literary whole intended to impress the mind by its general structure and special characteristics. The student's attention may be so much directed to the words as illustrations of etymological forms and changes, that he may lose the broad outlines of the story, the lofty thoughts it enshrines, and the complete purpose of his study, in the clouds of a narrow verbal criticism. Reading 'words, words, words,' he may fail to grasp 'the matter' they express. With a view to prevent this mistake being made we offer then as our first help this counsel: Before making any examination of individual words or sentences, read the play through thoughtfully, and, if possible, continuously, as a work of literature, bending your mind chiefly to the point of gaining a clear and connected view of the plot, the succession of the incidents, and their relation to each other. In doing this you will probably come upon strange words and difficult constructions, but we would recommend that you should not in this first reading turn to dictionary or glossary for the explanation of words, nor yet dwell long on what may seem to be syntactical puzzles. The clearing up of verbal difficulties, and the unravelling of grammatical tangles should be postponed to a later reading when such processes would not interfere with your object of obtaining a good general view of the play.

After such a careful first reading as we have recommended, the student should be able to write an outline of the play simply as a story; and we suggest further that this should now be done without any attempt at criticism of style or character, but so that the main features of the plot may be impressed upon the mind. This work will be a valuable exercise in composition, and form a useful foundation for further study. An exemplification of this exercise is left till next month that our readers may make an independent attempt.

The student who follows the plan here laid down will inevitably be led to form, even at this stage, some opinions respecting the various characters of the *dramatis personæ*. But his impressions of this kind, after a single reading, however careful, will probably be rather indefinite and need correction on repeated reading. We would, however, urge as a matter of primary importance, that opinions on character and incident should be formed on the student's own reading of the play; for the independent formation of such opinions seems to us one of the most valuable elements in the study of a literary work. This brings us to another practical suggestion: Do not endeavour in the early stages of your study to arrive at a proper understanding of the drama by reading the various views which other people have formed on the subject. The opinions which have been published respecting the play of Hamlet and its characters are many, we might say 'their name is legion.' They also differ very widely in many particulars; but it will be best to defer reading them until careful study has resulted not only in a thorough acquaintance with the play, but also in a power to weigh and compare these differing opinions. At the close of these papers we hope to give a selection of passages from the most important critics of Hamlet, which may put the student in a position to verify, to amplify, or to correct his own impressions.

We have been led to make these remarks because in the multitude of published criticisms there is some danger that literary study should degenerate into reading books *about* the finest works of literature, and the adoption of opinions at second-hand, rather than thoughtful independent study of these works themselves; and further, second-hand opinions are of little worth as a result of that study which is fitted to contribute more than most others to the furnishing of a cultured mind.

The requirements as to grammar, analysis, paraphrase and allusions, as laid down in the syllabus, must not be lost sight of. It will be necessary to make a careful examination of verbal and grammatical

peculiarities. To do this effectively in accordance with principles already referred to, we suggest the following plan. Let the student take one of the ordinary separate copies of the play—the Clarendon Press edition is, perhaps, as suitable as any, though one without notes would serve this special purpose—and let him proceed scene by scene to mark the words, phrases, and sentences which may seem for any reason to require comment, explanation, or illustration. Next, let him, from his own knowledge or observation, make such annotations on the marked passages as seem helpful to a real understanding of the same. Let the student's own notes then be compared with those given in an annotated copy, and let the necessary corrections be made and omissions supplied. The knowledge thus gained is likely to be far more thorough than it would be possible to derive from simply turning to glossary or notes without previously attempting to discover for one's self the explanation of difficulties. As this method calls for a continuous and independent exercise of thought it is likely to prove far more interesting than the plan of reading notes and calling upon the memory to store them up.

In order to illustrate this method the opening of the play is here printed with such marking as is recommended.

Act I.

Scene 1. ELSINORE. A platform before the castle.

Francisco at his post. Enter to him *Bernardo.*

Ber. Who's there?
Fran. Nay, answer *me*: stand, and *unfold yourself.*
Ber. Long live the King!
Fran. Bernardo?
Ber. He.
Fran. You come most carefully *upon your hour.*
Ber. 'Tis now struck twelve; *get thee* to bed, Francisco.
Fran. For this relief *much* thanks: 'tis *bitter* cold,
And I am *sick at heart.*
Ber. Have you had quiet guard?
Fran. Not a mouse stirring.
Ber. Well good night.
If you *do* meet Horatio and Marcellus,
The *rivals* of my watch, bid them make haste.
Fran. I think I hear them. Stand, ho! Who is there?

Enter *Horatio* and *Marcellus.*

Hor. Friends to this ground.
Mar. And *liegemen* to *the Dane.*
Fran. Give you good night.
Mar. O, farewell, honest soldier:
Who hath relieved you.
Fran. Bernardo hath my place.
Give you good night. [*Exit.*
Mar. Holla! Bernardo!
Ber. Say, *what,* is Horatio there?
Hor. *A piece of him.*
Ber. Welcome, Horatio; welcome, good Marcellus.
Mar. What, has this thing appear'd again to-night?
Ber. I have seen nothing.
Mar. Horatio says 'tis but our *fantasy,*
And will not let belief take hold of him.
Touching this dreaded sight, twice seen *of* us:
Therefore I have entreated him *along*
With us to watch the minutes of this night,
That if again this apparition come,
He may *approve* our eyes and speak to it.
Hor Tush, tush, 'twill not appear.
Ber. Sit down awhile;
And let us once again assail your ears,
That are so fortified against our story,
What we two nights have seen.
Hor. Well, *sit we down,*
And let us hear Bernardo speak of this.
Ber. Last night of all,
When *yond* same star that's westward from the pole
Had made his course to *illume* that part of heaven
Where now it burns, Marcellus and myself,
The bell then beating one,—
Mar. Peace, *break thee* off; look, where it comes again!
Ber. In the same figure, like the king that's dead.
Mar. Thou art *a scholar,* speak to it, Horatio.
Ber. Looks it not like the King? mark it, Horatio.
Hor. Most like: it *harrows* me with fear and wonder.
Ber. It would be spoke to.
Mar. Question it, Horatio.
Hor. What art thou that *usurp'st* this time of night,
Together with that fair and warlike form
In which *the majesty of buried Denmark*
Did *sometimes* march? by heaven, I charge thee, speak.
Mar. It is offended.
Ber. See, it *stalks* away!
Hor. Stay! speak, speak! I charge thee, speak!
[*Exit Ghost.*
Mar. 'Tis gone, and will not answer.
Ber. How now, Horatio! you tremble and look pale:
Is not this something more than fantasy?
What think you *on't?*
Hor. Before my God, *I might* not this believe
Without the *sensible* and true *avouch*
Of mine own eyes.
Mar. Is it not like the King?
Hor. As thou art to thyself:
Such was the very armour he had on,
When he *the ambitious Norway* combated;
So frowned he once, when in an angry *parle,*
He smote the *sledded Polacks* on the ice.
'Tis strange.
Mar. Thus twice before, and *jump* at this *dead hour,*
With *martial stalk* hath he gone by our watch.
Hor. In what particular thought to work I know not;
But, in *the gross* and *scope* of my opinion,
This *bodes* some *strange eruption* to our state.

Mar. Good now, sit down, and tell me, he that knows,
Why this same strict and most observant watch
So nightly *toils* the *subject* of the land,
And why such daily *cast* of brazen cannon,
And *foreign mart* for implements of war;
Why such *impress* of shipwrights, whose sore task
Does not divide the Sunday from the week;
What *might be toward*, that this sweaty haste
Doth make the night *joint-labourer* with the day:
Who is't that can inform me?

We now proceed to deal with this opening portion of the play, so as to exemplify the plan on which the student is recommended to make notes for himself on the words, phrases, and sentences which seem to need annotation:

Elsinore—a fortified place north of Copenhagen, commanding the narrowest part of the Sound. The name means the shore near the town of Helsing.

me—this is emphatic, the sense being that it is rather the new-comer's duty to answer the sentinel.

unfold yourself—make yourself known.

Long live the King!—this was the watch-word for the night.

upon your hour—very punctually, just before your appointed time.

much thanks—'much' seems to have been formerly used in the sense of 'great,' both with singular and plural nouns. In Luke xii. 19, we find 'Thou hast much goods laid up.'

bitter—used as adverb to modify adjective 'cold.' As Dr. Abbott points out in his 'Shakespearian Grammar,' adjectives are freely used as adverbs in Shakespeare's plays: many instances will be found in *Hamlet*.

sick at heart—low-spirited. The same expression is used by Macbeth. Compare 'Hope deferred maketh the heart sick.' Proverbs xiii. 12.

do—expletive used for sake of rhythm. This is a common artifice of the poet.

rivals—partners. This though a very rare use of the word 'rivals' is nearer to its original meaning. 'Rivals' is derived from Latin *rivus*, a stream, and was first applied to those who lived on the banks of the same river and shared the right to make use of the water. This partnership led to contention, and thus the idea of opposition was imported into the word.

liegemen—subjects, owing service, from Fr. *lige*, Low Latin *litus*, *ledus*, bound to the soil.

the Dane—the King of Denmark.

Give you good night—elliptical expression for 'God give you good night.' Compare 'Bless you,' 'Save you.'

What—used by Bernardo, and immediately afterwards by Marcellus, as an interjection, with a very slight trace of interrogative meaning.

a piece of him—a playful reply, with a possible touch of earnest in it, implying, as a German critic suggests, that Horatio's philosophic mind is not thoroughly engaged in the story of the Ghost, that his heart is not in the object of their special watch.

fantasy—imagination. This word, derived through the Latin *fantasia* from the Greek φαινω, I bring to light, I make appear, is an earlier form of the word 'fancy.'

Touching—concerning. This is one of a class of prepositions in the form of present participles, which somewhat resemble participles used in an absolute phrase.

seen of us—seen by us. 'Of' was commonly used for 'by.' Compare many passages in the Bible, 'seen of Cephas,' 'called of God.'

along—Dr. Abbott suggests a comma after this word to show its closer connection with the verb 'entreated.'

approve—corroborate, confirm.

What we two nights have seen—There is some difficulty about the relation of this clause; it may be regarded as an explanatory clause in apposition to 'story,' or as standing in the objective relation to some such verb as 'tell,' or 'narrate,' as the equivalent of 'assail your ears.' 'What' is, of course, the object of 'have seen,' and 'nights' is also in the objective case as a noun denoting time.

Sit we down—This is an instance of what is called the imperative of the first person plural. It may, however, be taken as a kind of conditional mood, the expression being equivalent to 'suppose we sit down.'

Last night of all—A short line of two feet, followed by a solemn pause, introducing Bernardo's story of the ghost.

yond—an adjective of distinction, more frequently spelt 'yon.'

to illume—to enlighten. This is the only time this word occurs in Shakespeare's plays, but 'relume' is found in *Othello* v., 2.

beating—striking; 'tolling' is used in Shakespeare's first version of *Hamlet*.

break thee off—We have here a curious, but, with Shakespeare, a not uncommon use of the second personal pronoun in the objective form instead of the nominative.

Thou art a scholar—From the practice of priests in the Church repeating Latin formulas for the exorcism of spirits arose the superstition that only scholars, that is, persons acquainted with Latin, could hold communication with ghosts. Numerous instances of the reliance of the superstitious on the influence of Latin over apparitions and evil spirits are to be found in our literature.

it harrows me—'Harrows' is here used as a bold metaphor, carrying the mind to the idea of the tearing up of clods by the harrow, used for breaking up the soil.

It would be spoke to—It wishes to be spoken to. The use of 'would' for 'wishes' is frequent, but there is usually a trace of the conditional about it. Here it is a matter of surmise or inference. 'Spoke' for 'spoken' is an example of a very common usage in the Elizabethan and even later writers. It is explained as arising from a tendency to drop the *en* at the end of participles—as 'writ' for written. There is a superstitious idea that ghosts cannot speak until they have been spoken to.

Usurp'st—takest possession of. This word may be traced through the French *usurper* to the Latin *usurpo*, from *usus*, use, and *rapio*, I snatch.

the majesty of buried Denmark—'Denmark' here means the King of Denmark, and 'majesty' is a courtly reference to his royal bearing.

sometimes—for 'sometime' in the sense of 'formerly.'

stalks—walks proudly. This word often implies an *assumption of* dignity, as in walking on stilts.

Exit Ghost—*Exit*, Latin for 'goes out.'

on't—of it. The use of 'on' for 'of,' meaning about, concerning, and even in its possessive sense is extremely common in Shakespeare and other early writers, and it is a common colloquialism now in many parts of England.

I might not—I could not, with conditional meaning.

sensible and true avouch—'sensible' is used with a passive meaning—being influenced and convinced by the actual sight; 'avouch,' the only time this word is used substantively by Shakespeare. It is an example of what frequently occurs, the simple form of a verb used as an abstract noun without any distinctive termination: we might expect such a form as 'avouchment.'

the ambitious Norway—'Norway' means the King of Norway, as 'Denmark,' already noted, means the King of Denmark. In the historical plays 'France' and 'England' are frequently used instead of the names of their respective kings. 'Ambitious' has an interesting derivation; the Latin *ambi*, round about, and *eo*, I go, when compounded become *ambio*, I go round about; hence *ambitio*, the act of going round about, or *canvassing* to secure votes or influence to obtain honours or other advantages, and hence our word ambition, with its meaning of desire, usually extravagant desire, for honour and power.

parle—for 'parley,' encounter, from French *parler*, to speak.

sledded Polacks—'sledded' from 'sled' or sledge, a vehicle without wheels used in countries where there is much snow and ice. 'Polacks,' Polanders. Some editors adopt the singular form, using the name as 'the Dane' is used in line 15 of this scene.

jump at this dead hour—'jump' means 'just,' the latter word being substituted in some editions, 'jump' occurs again in Act V. 2.

dead hour—midnight; compare 'We buried him darkly at *dead* of night,' Campbell.

martial stalk—proud walk as of a soldier. 'Martial' from *Mars*, the God of war.

gross and scope—Here Horatio, being at a loss for definite understanding of the circumstance, expresses a general view of what it may mean; 'gross' means general, 'scope,' field or range of view, from Greek σκοπεω I see.

bodes—portends; the root is the same as that of 'bid.'

strange eruption, remarkable disturbance. The derivation of 'strange' is noteworthy. From the Latin *extra*, beyond, is formed the adjective *extraneus*, belonging to what is outside; and in Old French this became *estrange;* this became adopted into the English language in the form 'strange,' while in modern French the *e* is retained and the *s* lost in *étrange*, foreign.

Good now, sit down, and tell me, he that knows. The speech of Marcellus which begins with this line abounds in interesting points of grammar. 'Good now' is elliptical, some such word as 'friends,' or 'comrades' being understood after good. The subject of 'tell' is, according to common use, thou or you understood; but a sort of secondary or alternative subject is found in the pronoun 'he' which forms the antecedent to the amplification 'that knows.' The next six lines contain four substantive clauses which form direct objects of 'tell' and also of 'know.'

toils is here a transitive verb meaning 'causes to toil.'

the subject, a singular noun used with collective sense for 'people'; compare 'general' used with same meaning in the phrase 'caviare to the general' in this play, Act II. 2.

cast, used for the abstract or verbal noun 'casting.'

foreign mart—purchasing from abroad. 'Foreign' is derived from Latin *foras*, out of doors, Low Latin *foraneus*—and French, *forain*. 'Mart' is contracted from 'market,' German *markt*, Latin *mercatus*, from *merx*, merchandise.

impress—a verb in form used as abstract noun for 'impressment,' act of compelling service.

does not divide the Sunday from the week—makes no difference between Sunday and other days.

What might be toward—'what may possibly be at hand;' but 'might' implies more of uncertainty than 'may.' The verb is conditional or subjunctive; 'toward' is here an adverb; it should be accented on the first syllable.

the night joint-labourer with the day—work going on continuously night and day.

It is not intended in these papers to continue the printing of the text, nor to examine the words and structure as minutely as we have done in this opening section. It has been done so far to help the student by giving him a model of the kind of verbal annotation which he can carry out himself.

In future papers we shall discuss the important difficulties of grammar and meaning, paraphrasing and analysing passages where that course may seem needful. Interesting etymologies will also be traced out, as in that way it is often possible to arrive at a more exact appreciation of the meaning of a passage, and the fitness or beauty of the language.

(To be continued.)

Knitting Maps.

BY MRS. J. D. HARRIS.

Now that Knitting is so universally taught in Schools, it is as well to have some method that is not only accurate but also easy of comprehension.

The old 'Rule of Thumb,' by which stockings rarely came out an exact pair, is now entirely superseded, and by using the 'Stocking Map' anyone who can knit on four pins will find that all difficulties of shaping a leg or turning a heel will vanish, as at every stage the exact number of stitches is marked, and full directions are given at every change.

CHILD'S STOCKING.

Chamber's Bell Guage.

Pins No. 15, 20 stitches on each pin.

3½ oz. of Berlin Fingering.

Knit 2, purl 2 for 1½ inches.

A. Knit 10, take up seam-stitch. Knit 3½ inches.*

B. Knit 7, knit 2 together, knit 1, seam 1, knit 1, slip 1, knit 1, pick slipped stitch over.
Knit 6 plain rounds.
Repeat till only 51 stitches left.

C. 51 stitches. Knit 3 inches more.

Heel.

D. 25 stitches on back or heel-pin, 13 on each instep-pin.

E. Knit and purl alternate rows of heel-pin, slipping the 1st stitch of each row till there are 8 loops on each side.

F. Purl 14, purl 2 together, turn the pin.
Knit 4, knit 2 together, turn the pin.*
Purl 4, purl 2 together.

* Repeat till all the stitches are taken up. There should be 5 left on the pin.

G. 1st heel-pin.
Take up 8 loops.

H. Knit 3 from 1st instep-pin on the same pin.
Knit the remaining instep stitches on one pin, all but the last 3, knit these on 2nd heel-pin, and take up 8 loops, and knit 3 from 1st heel-pin.
Knit 1 plain round.

I. 1st heel-pin. Knit to within 5 of the end, knit 2 together.
2nd heel-pin. Knit 3, slip 1, knit 1, pick slipped stitch over.
Knit one round between each reducing.

K. Reduce to 46 stitches. Knit 3 inches.*

L. 15 on each back pin, 16 on front.
Knit the 2 first stitches of each pin together.
2 plain rounds between each reducing.
When reduced to 10, divide on 2 pins, knit together, and cast off.

Pupil Teachers.

(By an Inspector.)

MUCH has been written, and much remains to be written, on the position, selection, maintenance, and tuition of our embryo school teachers. And on each of the heads enumerated much careful thought is required by those concerned in the appointment of suitable candidates.

In former years the office of a Pupil Teacher was considered to be the post of honour for the cleverest and best behaved pupil in the school. Parents of the better class who availed themselves of elementary education for their children, vied with each other to obtain this desirable appointment, and for these reasons: 'That should the pupil not wish to continue in the profession, the good education obtained so cheaply fitted him for a successful competition in one of the branches of the Civil Service, or that the candidate was at that time promised such advantages as would almost certainly ensure him a remunerative career.'

But affairs have altered very considerably since those halcyon days of pupil-teacherdom.

For whereas, formerly, there was almost a competition for such employment, it is now often a matter of extreme difficulty to obtain suitable candidate Pupil Teachers. The causes of this change are not far to seek. The very considerably increased labour thrown upon the Pupil Teacher as well as the Teacher, by the introduction of the New Code, which, be it observed, assumed that the same staff would be strong enough to teach the extra subjects, as well as the elementary ones,—this serious additional labour has undoubtedly been one of the causes which has conspired to limit the number of aspirants for the post of Pupil Teacher. It is all very well for large school boards to insist upon their Pupil Teachers being eased off during the week by being given time for their private studies in what had been school hours. The smaller school boards, and most of the voluntary schools, have not sufficiently strong staffs to allow of this indulgence *under the increased burthen of the New Code.*

Again, a feeling has gone abroad that the Pupil Teacher system is doomed. Leading educational authorities have pronounced it a failure. Newspaper-reading parents cannot but be affected by the publication of such views. They say, 'If the system is a failure, am I to apprentice my child for four years under such a system?' Again, in all the large wage-earning districts there is a natural impatience on the part of the young people to obtain early and lucrative work, in preference to the more gradually paid, if in the end more paying, employment of a teacher.

Further, we are living in an age where domestic restrictions are not as readily submitted to by the young as they have been in the past. A desire for early independence, often a dangerous desire, has rooted itself ineradicably in the minds of the rising generation.

This is to our knowledge painfully true in large manufacturing centres. Here the lads and girls of fifteen and sixteen will actually earn sufficient wages to set up on their own account.

In the good old days their wages would have been invariably handed over by these young people to their parents. Now the words of the Evangelist are only too applicable in many northern towns, 'It is a gift whereby thou may'st be profited by me.' Arrangements are made by which a boy or even a girl pays his own parents for board and lodging, on the condition of retaining the rest of the wages earned—a very considerable balance in the case of some industries. Even in the agricultural districts there is a restless radiation on the part of the brighter lads and girls into the towns and cities. Only too many of these young people fail miserably in their attempts to obtain suitable employment in these centres. Country bred as they are, their health soon suffers in the back slums or jerry tenements into which they are of necessity driven. But they are too proud to return to their villages and there acknowledge their failure, and so serve as warning examples to their young neighbours. No, in nine cases out of ten they emigrate on the first opportunity.

And so the depletion into the cities of the best materials for Pupil Teachers continues.

The half and full time regulations also seriously affect the supply of Pupil Teachers.

Children may, in most cases, leave off attending school after passing Standard IV., which they can do at the age of 10 or 11 years, yet they cannot be apprenticed till they are at least 14 years of age.

How are they to be retained until they can be regularly employed upon the staff? This is a problem which has puzzled many a teacher who has found a promising pupil. Might it not answer for the Education Department, on the recommendation of H.M. Inspector, to make an allowance for such a candidate, or at any rate to pay his school fees on the principal of the old Honour Certificate?

Some managers pay their fees and give a little pocket money into the bargain to such children on condition of their beginning to teach a little at this early age. Yet parents are not readily induced to enter into arrangements of the kind, and the Departmental plan of half time monitors, *i.e.*, two monitors alternately teaching and being taught, has not proved a success.

But speculation apart as to the future, how are we to cope with the difficulties of selecting and training Pupil Teachers in the present.

We have quite given up the old fashioned idea that the delicate or deformed child is the one to be set apart for the office of teacher. Since the Schoolmaster has been really abroad this notion has been exploded. When a teacher could teach as much or as little as he liked there was some meaning in it. But the labours of the teacher of 1887 demand a strong physique. They are beyond the powers of the weakling.

The work of teaching in close class-rooms at the critical age of from 14 to 18 and there battling with the many varying and often trying temperaments of a large class and, superadded to all this, the daily incubus of private study often undertaken when the brain is tired and the body jaded, these are not tasks to be lightly undertaken by any but the most expert both mentally and physically.

Never, therefore, for fear or favour or under a mistaken sense of kindness, recommend your managers

to appoint as a Candidate Pupil Teacher any but an active minded and able bodied lad or lass. And where the choice lies between an intellectual weakling and a robust plodder, choose the latter.

Again, teachers in advising with their managers on the selection of Pupil Teachers, should seriously consider their home surroundings and home influences.

This is an essential too often carelessly overlooked. 'Like parent, like child,' as a rule. A candidate's control and moral suasion over his pupils will largely depend upon the home authority which has been exercised over him. If gentle and judicious it will in all probability be thus carried on by him to his class; if rough, or harsh, or domineering, it will too often find only too faithful a reflection in a rude, arrogant manner with the children under his control.

Again, the home must be one admitting of the quiet prosecution of study.

How often have we heard as the excuse for the failure or partial failure of a Pupil Teacher at his examination. 'But, Sir, the boy had never a chance of studying at home. He was expected to do far too much for his parents.' Just so. But that fact should have been ascertained before the lad was apprenticed.

Especial care should be taken in appointing a publican's child as a Pupil Teacher to ascertain that the public-house is conducted on the very best principles. Some of our readers would doubt the wisdom of ever making an appointment of the kind, but we have known instances where it has been more than justified.

Teachers, through their managers, should also be most careful to ascertain whether there is every probability of the terms of the agreement being faithfully carried out by the parents or guardians, as nothing is more embarrassing than for a Pupil Teacher to leave in the third or fourth year of his apprenticeship—that is to say just when he is beginning to repay the labour expended on his training—simply because his father is a man of migratory disposition.

It may be here convenient to consider the requirements of the Code.

The question is often asked, may extra Pupil Teachers be employed in a school? For example, if there are 100 scholars in a school, is there anything to prevent two Pupil Teachers being appointed. Nothing, of course. It is only strange that this obvious answer is not more generally known. The misapprehension is doubtless due to the fact that the Department will not pay the £2 or £3 grants under Article 110 of the Code for any Pupil Teacher beyond the minimum number required.

Teachers who are about to take charge of Pupil Teachers for the first time, and whose managers are not well versed in the varying requirements of the Code, should bear the following regulations very carefully in mind.

A candidate may first serve as a probationer for one year if he has passed the necessary examination, and is of the age of 13 before the end of the school year, and at that examination must pass in each of the elementary subjects required of Standards V. or VI. as well as in two extra ones.

But it is not *essential* that he should so serve as a probationer.

If he does so he becomes part of the school staff, and counts for an average of twenty scholars. At the end of this time the candidate Pupil Teacher must pass a similar examination in Standard VI. or Standard VII., but he may be so presented without having gone through a year's preliminary probation, provided he be of the age of 14 years before the expiry of the school year.

Then his term of agreement—the indentures for which will be supplied free of cost by the Education Department—will be for four years. Should the teacher, however, have obtained a candidate of a suitable age, he might present him as a candidate at the end of the first or second year. Such candidates, however, must be of the age of 15 or 16 respectively.

The examination of a candidate may be passed on the occasion of the school inspection, due notice having been given to H.M. Inspector, or at the local centre for the examination of Pupil Teachers, upon notification to that effect in the preliminary form sent to the managers by the Department.

(To be continued.)

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Christopher Columbus, by Lamartine.

TRANSLATED BY A. M. BOWER, F.R.G.S.,

Late Master in University College School, London.

CHRISTOPHE COLOMB.	CHRISTOPHER COLUMBUS.
PREMIÈRE PARTIE.	FIRST PART.

CHAPTER I.

Dieu se cache	God conceals himself (=his intervention)
dans le détail	in the trifling-occurrences
des choses humaines,	of human affairs,
et il se dévoile	and he reveals himself
dans l'ensemble.	in their totality *(ensemble)*.
Aucun homme sensé	No intelligent man
n'a jamais nié	has ever denied
que les grands événements	that the great events
qui composent la vie historique	which form the historical life
de l'humanité	of mankind
ne fussent reliés	were (= are) connected
et coordonnés secrètement	and in-secret regulated
par un fil invisible	by an unseen thread
suspendu	attached
à la main toute-puissante	to the all-powerful hand
du souverain ordonnateur	of the sovereign disposer (ruler)
des mondes,	of the universe,
pour les faire concourir	to cause them to agree
à un dessin et à un plan.	in a design and a plan.
Comment celui qui a donné	How should he who has given
la lumière à l'œil	sight (light) to the eye
serait-il aveugle?	be blind (himself)?
Comment celui qui a donné	How should he who has bestowed
la pensée à sa créature	thought on his creature
serait-il lui-même	be himself
sans pensée?	without thought?
Les anciens appelaient	The Ancients named (called)
ce plan occulte, absolu	this occult, absolute
et irrésistible de Dieu	and irresistible design of God

dans les choses humaines,	in human affairs,
le Destin, La Fatalité ;	Destiny, Fate ;
les modernes l'appellent	the Moderns call it
la Providence,	Providence,
nom plus intelligent,	(a) name more intelligent,
plus religieux	more reverential,
et plus paternel.	and more paternal.
En étudiant	In studying
l'histoire de l'humanité	the history of mankind
il est impossible	it is impossible
de ne pas reconnaître,	not to recognise,
par-dessus et par-dessous	above and beneath
l'action libre de l'homme,	the free agency of man,
l'action souveraine	the all-powerful
et transparente	and manifest agency
de la Providence.	of Providence.
Cette action d'ensemble	This agency of the universal
et de masses	and of the aggregate
n'exclut en rien	in no wise precludes
la liberté de nos actes,	the freedom of our acts,
qui fait seule	who alone constitutes
la moralité des individus	the morality of the individual
et des peuples ;	and of the masses ;
elle semble les laisser,	it seems to allow them
se mouvoir, agir, egarer	to move, act, go astray
avec une latitude complète	with complete freedom
d'intention,	of will (to choose, &c.),
de choix du bien et du mal,	of choice of good and evil,
dans une certaine sphère d'action	within a certain sphere of action
et avec une certaine	and with a certain
conséquence logique	logical consequence (result)
de peines encourues	of penalties incurred
ou de rémunérations méritées,	and of rewards deserved,
selon que leur intention	according as their intention
a été plus droite	was more righteous
ou plus viciée ;	or more wicked ;
mais les grands résultats généraux	but the grand general consequences
de ces actes	of these acts
des individus ou des peuples	of individuals or of nations
lui appartiennent à elle seule.	belong to it (Providence) alone.
Elle semble	It (Providence) seems
se les reserver,	to reserve them to itself,
indépendamment de nous,	independently of us,
pour des fins divines	for divine purposes
que nous ne connaissons pas,	which we do not understand,
et qu'elle nous laisse	and which it permits us
seulement entrevoir	to perceive only
quand elles sont	when they are
presque atteintes.	almost accomplished.
Le bien et le mal	Good and evil
sont de nous	are from us
et sont à nous ;	and belong to us ;
mais la Providence	but Providence
se joue de nos perversités	makes sport of our vices
comme de nos vertus ;	as well as of our virtues ;
et de ce bien et de ce mal	and from this good and this evil
elle tire	it derives
avec une égale infaillibilité	with an equal infallibility
de sagesse	of wisdom
l'accomplissement de son dessein	the fulfilment of its design
sur l'humanité.	with regard to mankind.
L'instrument caché,	The instrument concealed
mais divin,	but (still) divine
de cette Providence,	of this Providence,
quand elle daigne	when it condescends
se servir des hommes	to make use of man
pour préparer	in order to prepare
ou pour accomplir	or accomplish
une partie de ses plans,	a part of its plans,
c'est l'inspiration !	is inspiration !
L'inspiration est véritablement	Inspiration is in truth
un mystère humain	a human mystery
dont il est difficile	of which it is difficult
de trouver la source	to find the source
dans l'homme même.	in man.
Elle semble venir	It seems to come
de plus haut	from (a) higher (source)
et de plus loin.	and from (a) more distant (origin).
Voilà pourquoi	This-is (behold) why
on lui a donné	they have given to it
un nom mystérieux aussi,	a mysterious name also,
et qui ne se définit bien	and which is not well defined
dans aucune langue :	in any language :
génie.	*genius.*
La Providence fait naître	Providence produces
un homme de génie ;	a man of genius ;
le génie est un don :	genius is a gift :
il ne s'acquiert pas	it is not acquired
par le travail ;	by hard labour ;
il ne s'obtient pas	it is not obtained (gained)
même par la vertu ;	even by virtue ;
il est ou il n'est pas,	it exists or it does not exist,
sans que celui-là même	without the man even
qui le possède	who possesses it
puisse rendre compte	being able to give an account
de sa nature	of its nature
et de sa possession.	or of its possession.
A ce génie, La Providence	To this genius Providence
envoie une inspiration.	sends (an) inspiration.
L'inspiration est au génie	Inspiration is to genius
ce que l'aimant	what the magnet
est au métal.	is to the metal.
Elle l'attire,	It (inspiration) attracts it (genius)
indépendamment	independently
de toute conscience	of all conscience
et de toute volonté,	and of all will,
vers quelque chose	towards something
de fatal et d'inconnu,	(of) fatal and (of) unknown,
comme le pôle.	just as the pole.
Le génie suit	Genius follows
cette inspiration	this inspiration
qui l'entraine,	which hurries it along,
et un monde moral	and a moral world
ou un monde physique	or a physical world
est trouvé.	is discovered.
Voilà Christophe Colomb	Hence Christopher Columbus
et la découverte	and the discovery
de l'Amérique !	of America !

(To be continued.)

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Recent Inspection Questions.

Arithmetic.

STANDARD I.

A.

1. 73 + 904 + 720 + 86 + 9. 1792. Ans.

2. From 798 take 389. 409. Ans.

3. From 104 take 89. 15. Ans.

B.

Another District.

1. Add 842, 76, 423, 89 and 725. 2155. Ans.

2. From 326 take 97. 229. Ans.

3. From 416 take 172. 244. Ans.

Mental Arithmetic.

Six times 4? 3 times 9? 4 times 6? Halfpennies in 3½d.? In one shilling? In 1s. 3½d.? How many apples for 1s. 2d. at 2d. each? I had 48 oranges at first. I threw away 8; then gave away half, and then half were bad, how many had I left?

STANDARD II.

A.

1. 56,789 × 98. 5,565,322. Ans.

2. 94,300 ÷ 12. $7,858\frac{4}{12}$. Ans.

3. 73,209 − 5,868. 67,341. Ans.

B.

Another District.

1. 6,298 × 409. 2,575,882. Ans.

2. 84,012 − 17,905. 66,107. Ans.

3. 45,892 ÷ 8. $5,736\frac{4}{8}$. Ans.

4. 8,217 ÷ 11. 747. Ans.

STANDARD III.

A.

1. Divide three million sixteen thousand nine hundred and sixty-five by eight hundred and eighty-three. $3,416\frac{637}{883}$. Ans.

2. From £3,000 19s. 6¾d. take £1,963 18s. 1½d.
£1,037 1s. 5¼d. Ans.

3. Add together £2,908 14s. 7¾d., £3,087 10s. 11d.; 17s. 8¼d., £8,004 19s. 10¾d., £64 7s. 8½d.
£14,066 10s. 10¼d. Ans.

4. A woman had 5s. She sold butter for 3s. 6d., and eggs for 2s. 6d. She bought flour for 4s. 6d., tea for 1s., sugar for 10½d., and beef for 4s. 6d. What money did she take home?
(5s. + 3s. 6d. + 2s. 6d.) − (4s. 6d. + 1s. + 10½d. + 4s. 6d. 1½d. Ans.

B.

1. Divide nine million six hundred and ninety-six thousand three hundred and fifty-six by one thousand and nineteen. $9,515\frac{871}{1019}$. Ans.

2. What will 460 ships cost if one cost £696?
£320,160. Ans.

3. From £3,006 10s. 7¼d. take £2,098 19s. 10½d.
£907 10s. 8¾d. Ans.

4. Add together £4,937 16s. 11d.; £73 15s. 9½d.; £9,695 3s. 10¾d.; £17 17s. 7d.; and £6,589 7s. 9¾d.
£21,314 2s. Ans.

STANDARD IV.

A.

1. Reduce 708 half crowns to farthings.
84, 960 farthings. Ans.

2. Divide nine thousand and seventeen pounds five shillings and sevenpence three farthings, by forty three.
£209 14s. $1\frac{9}{43}$d. $\frac{3}{43}$. Ans.

3. Multiply £680 19s. 8½d. by 907.
£617,653 15s. 5½d. Ans.

4. Reduce 3 cwt. 1 qr. 21 lbs. 5 oz. to drams.
98,640 drams. Ans.

B.

1. Multiply £59 17s. 3½d. by 79.
£4,729 6s. $0\frac{1}{2}$d. Ans.

2. How many miles are there in 109,641 ft.?
20 m. 6 fur. 4 per. 5 yds. Ans.

3. Divide £7,391 10s. 7½ by 39.
£189 10s. 6¼d. $\frac{14}{156}$. Ans.

4. Six curtains cost £2 5s. 4d. the stuff cost 4/3 a yard, how many yards were there?
$10\frac{2}{5}$ yds. Ans.

STANDARD V.

A.

1. Find the value of 21 acres 1 rood 21½ poles, at £4 per acre.
£85 10s. 9d. Ans.

2. ½ + ⅓ + ⅚ − ⅞.
$\frac{19}{24}$. Ans.

3. Make a bill for—
22 lbs. @ 10d. per lb.; 5 stones @ 9½d. per lb., 68 lbs. @ ½d. per lb. and 190 @ 1/6 per score.
(18/4 + 55/5 + 2/10 + 14/3.)
£4 10s. 10d. Ans.

4. If a man owes £2,500, and pays 12/9½ in the pound, what does he still owe?
£1 : £2,500 :: 7/2½ : £901 0s. 10d. Ans.

B.

1. Find the value of $\frac{2}{3} + \frac{2}{5} + \frac{1}{6} - \frac{9}{10}$.
$\frac{1}{2}$. Ans.

2. If 13½ stones cost £2 7s. 3d. what will 7 lbs. cost at the same rate?
13½ : ½ :: £2 7s. 3d : 1s. 9d. Ans.

3. Show by practice the cost of laying 6 miles 5 fur. 12 poles 1 yd. of water pipe at £150 per mile.

£999 9s. $2\frac{5}{11}$d. Ans.

4. A ship containing a captain, officers and crew of 120 men, captures a prize worth £7,000. The captain gets the value of $\frac{1}{8}$th, the officers $\frac{1}{5}$th, and the remainder is divided among the men.

What does each man get?

£39 7s. 6d. Ans.

STANDARD VI.

1. If potatoes are sold at the rate of 5 lbs. for 2d., what is the value of 10·375 tons?

10·375 tons = 23,240 lbs.

5 : 23240 :: 2d : £38 14s. 8d. Ans.

2. $(520{\cdot}9 \times 6{\cdot}5) \div {\cdot}005$.

677,170. Ans.

3. Find the simple interest on £580 for $9\frac{3}{4}$ yrs. @ $4\frac{1}{4}$ per cent.

£240 6s. 9d. Ans.

4. Simplify $\frac{3\frac{1}{2} - 2\frac{2}{5}}{9\frac{1}{5} + \frac{7}{8}}$ of $1\frac{3}{8} \div \frac{1}{3}$.

$\frac{42}{106}$. Ans.

B.

1. Simplify $\frac{6}{7} + \frac{7\frac{3}{4} - 6\frac{1}{2}}{2\frac{1}{3} \times 9}$.

$\frac{11}{14}$. Ans.

2. Subtract 8·75 from the product of ·3625 and 95, and divide the result by ·053 to three decimal places.

484·669. Ans.

3. One pipe can fill a cistern in 2 hours, and another in 5 hours; in what time would they fill it both running together?

$1\frac{3}{7}$ hours. Ans.

4. Find the simple interest on £2,500 for 9 months at $6\frac{3}{4}$ per cent. per annum.

£126 11s. 3d. Ans.

STANDARD VII.

1. If a tobacconist buys 1 cwt. of tobacco for £18 13s. 4d., what must he sell it at per oz., so as to gain 20 per cent. on his outlay?

3d. per ounce. Ans.

2. In a mixture of tin and copper there are 5 lbs. of tin to 11 lbs. of copper: what is the percentage of each?

Tin, $31\frac{1}{4}$; Copper, $68\frac{3}{4}$. Ans.

3. A man puts £400 in the bank, and at the end of 3 months he takes out £100; At the end of another month he puts in £300. What is the average sum in the bank for six months?

$(400 \times 3 + 300 \times 1 + 600 \times 2) \div 6$.

£450. Ans.

4. At what rate per cent. will £850 12s. 6d. amount to £919 18s. 9d. in 4 years?

$2\frac{33}{34}$. Ans.

Dictation.

STANDARD I.

A.

Sweet, jump, waste, never, black.

B.

Another district.

Pretty, merry, home, shops, sugar, salt, neck, cloth, coat, boat.

STANDARD II.

A.

As larger and stronger ships were built, men became bolder. Instead of creeping along the shores of their own country, afraid of losing sight of land, they crossed the great ocean and sailed to other lands thousands of miles away.

B.

Another district.

A piece containing the following words. Difference, colour, owing, two, due, different, roasted, having.

STANDARD III.

A.

The ship was sinking by degrees, and I should be drowned. Oh! what would I not have given at that moment to have been safe in granny's shop, with the click of her knitting needles in my ear! I used to think them tiresome, but now they would have been the sweetest music.

B.

He was so pleased with the look of everything that he could not keep still a minute. Especially did he seem drawn towards something shining which covered nearly all the bottom part of the field. The mother-sheep uttered a quick cry. Young lamb as he was he hardly knew.

Grammar.

STANDARD IV.

Parse:

'No more for him the blazing hearth shall burn.'

Oral:

Questions asked on definitions of parts of speech, kinds of verbs, and how they were known, and on inflections of nouns for number and gender.

Also formation of different parts of speech from other parts of speech.

STANDARDS V. and VI. (together).

Parse:—

During our stay we were engaged in a deadly conflict.

Analyse:

Every turf beneath their feet shall be a soldier's sepulchre.

Oral:

What is parsing? What is analysing? What is mood? How is the passive voice formed? Give me some verbs in the active voice. Change them into the passive voice. What is the indicative mood? The imperative mood? What is the *voice* of a verb?

Query Column.

RULES.

1. Each correspondent is restricted to *one question*. We should be much obliged if correspondents, who send questions for solution, would give (if possible) the required answer, and the source from which the question is obtained.

2. No query can be answered unless accompanied by the real name and address of the sender, not necessarily for publication, but as a guarantee of good faith and for facility of reference.

3. **When a pseudonym is adopted it should be written at the end of the query, and the real name and address on a separate piece of paper.**

4. Correspondents are requested to write their queries *legibly*, and on one side of the paper only.

5. Replies will not be sent through the post.

6. Queries must reach the office *not later than the 12th of the month*, or they cannot be attended to in the following issue.

*** All communications for this column should be addressed—'*The Query Editor*,' *The Practical Teacher*, *Pilgrim Street, Ludgate Hill, London, E.C.*

Arithmetic.

1. FIRST YEAR P.T.—A person having a legacy of £560 8s. 2d. invests it in the 4 per cents. at 91; what is the present worth of his yearly dividend thereon, 3 months before it is payable, if the rate of interest be 3½ per cent.? (*Piper.*)

£ £ s. d. £
91 : 560 8 2 :: 4 : dividend

4
)2241 12 8(24£
182
421
364
57
20
1152(12s.
1092
60
12
728(8d.
728

¼ of £3½ = ⅛ £;

£ £ s. d. £
∴ 100½ : 24 12 8 :: 100 : Present worth
8 8
807 197 1 4
100
19706 13 4(24£
1614
3566
3228
338
20
6773(8s.
6456
317
12
3805(4d.
3228
580

= £24 8s. 4 4/19 d. Ans.

2. ANNIE LINDSAY.—Two places on the earth's surface move with velocities in the ratio of 5 : 2, their difference of latitude is 52°; find the latitude of the two places.

Difference between 5 and 2 = 3;

$\frac{52^\circ}{3} \times 5 = \frac{260^\circ}{3} = 86\frac{2}{3}^\circ$

$\frac{52^\circ}{3} \times 2 = \frac{104^\circ}{3} = 34\frac{2}{3}^\circ$

∴ Latitude of the two places
= (90° − 86⅔°) and (90° − 34⅔°)
= 3⅓° and 55⅔°. Ans.

3. CLAONA.—Simplify

$$\frac{2 \times \sqrt{1 + \frac{1}{3}} \div \sqrt{1 - \frac{1}{5}}}{5 \times \sqrt{1 + \frac{1}{3}} \times \sqrt{1 - \frac{1}{5}}}$$ (*Barnard Smith.*)

First Method.

$$= \frac{2 \times \sqrt{\frac{4}{3}} \div \sqrt{\frac{4}{5}}}{5 \times \sqrt{\frac{4}{3}} \times \sqrt{\frac{4}{5}}}$$

$$= \frac{2 \times \sqrt{\frac{4}{3} \times \frac{5}{4}}}{5 \times \sqrt{\frac{4}{3} \times \frac{4}{5}}}$$

$$= \frac{2 \times \sqrt{\frac{5}{3}}}{5 \times \sqrt{\frac{16}{15}}}$$

$$= \frac{2}{5} \times \sqrt{\frac{5}{3} \times \frac{15}{16}}$$

$$= \frac{2}{5} \times \sqrt{\frac{5}{16}}$$

$$= \frac{2}{5} \times \frac{\sqrt{5}}{4}$$

$$= \frac{1}{2\sqrt{5}}$$ Ans.

Second Method.

$$\frac{2 \times \sqrt{1 + \frac{1}{3}} \div \sqrt{1 - \frac{1}{5}}}{5 \times \sqrt{1 + \frac{1}{3}} \times \sqrt{1 - \frac{1}{5}}}$$

(Dividing numerator and denominator by $\sqrt{1 + \frac{1}{3}}$)

$$= \frac{2 \div \sqrt{\frac{4}{5}}}{5 \times \sqrt{\frac{4}{5}}}$$

$$= \frac{2}{5 \times \sqrt{\frac{4}{5} \times \frac{4}{5}}}$$

$$= \frac{2}{5 \times \frac{4}{5}}$$

$$= \frac{2}{4}$$

$$= \frac{1}{2}$$ Ans.

4. ONTARIO.—A man buys a note, drawn for two years, at 6 per cent. interest, and which is now six months old, at 15 per cent. true discount. After keeping it nine months, and receiving one payment of interest, he sells it to a bank at 8 per cent. bank discount. What per cent. does he make upon his money while invested?

£15 × 1½ = £22½;
∴ Present value of £122½ = £100;
Interest received on this amount for one year:
= 6 per cent. on £122½
= £7 7s.;
Bank discount on this amount:—
= 8 per cent. on £122½ for nine months.
= ¾ of 8 per cent. on £122½
= 6 per cent. on £122½
= £7 7s.;
On an outlay of £100 he gains £22½;
∴ Gain per cent. = 22½. Ans.

5. G. PHIPPS.—If the estimated annual value of the property in a certain parish consist of the yearly rent paid to the landlord together with the rates, and the rates be calculated on the rent after a reduction of 30 per cent., find the ratable value of a tithe-rent charge, the estimated annual value of which is £884 per annum, when the rates amount to 3s. in the pound. (*Barnard Smith.*)

Estimated annual value = rent + rates;
$\therefore$ £884 = rent + rates
= rent + rates on (rent − 30 °/₀ of rent)
= rent + rates on $\frac{7}{10}$ of rent
= rent + rate of 3s. in the £ on $\frac{7}{10}$ of rent
= rent + $\frac{3}{20}$ of $\frac{7}{10}$ of rent
= rent + $\frac{21}{200}$ of rent
= $\frac{221}{200}$ of rent;
$\therefore$ Rent = £884 ÷ $\frac{221}{200}$
= 800;
$\therefore$ Ratable value = $\frac{7}{10}$ of £800
= £560. Ans.

6. MAGISTER.—A debt is to be paid as follows:—$\frac{1}{4}$ at 2 months, $\frac{1}{5}$ at 3 months, $\frac{1}{6}$ at 4 months, $\frac{1}{8}$ at 5 months, and the balance at 6 months. What is the correct equated time to pay the whole, interest at 5 per cent.?

(Debt + $\frac{1}{10}$ debt) × time in months
= ($\frac{11}{40}$ of $\frac{1}{4}$ debt × 2) + ($\frac{11}{40}$ of $\frac{1}{5}$ debt × 3)
+ ($\frac{11}{40}$ of $\frac{1}{6}$ debt × 4) + ($\frac{11}{40}$ of $\frac{1}{8}$ debt × 5)
+ ($\frac{11}{40}$ of $\frac{3}{8}$ debt × 6)
= ($\frac{11}{20}$ + $\frac{33}{100}$ + $\frac{11}{30}$ + $\frac{11}{40}$ + $\frac{189}{160}$) times debt
= $\frac{84 + 63 + 84 + 105 + 378}{160}$ times debt
= $\frac{714}{160}$ times debt
= $\frac{357}{80}$ times debt;
$\frac{11}{40}$ debt × time in months = $\frac{357}{80}$ debt
$\therefore$ Time = ($\frac{357}{80}$ ÷ $\frac{11}{40}$) months
= $\left(\frac{357}{80} \times \frac{20}{11}\right)$ months
= $4\frac{1}{4}$ months. Ans.

7. MAGISTER.—A owes me £480 due in $3\frac{1}{2}$ months, £607 due in 2 months, £577 15s. due in 5 months. What sum should I accept as a single payment at the end of 6 months, interest at 4 per cent.?

Interest on £480 for $2\frac{1}{2}$ months at 4 °/₀
= $\frac{1}{25}$ of $\frac{5}{24}$ of £480
= £4;
Interest on £607 for 4 months at 4 °/₀
= $\frac{1}{75}$ of $\frac{1}{3}$ of £607
= $\frac{1}{75}$ of £202 6s. 8d.
= £8 1s. $10\frac{2}{3}$d.;
Interest on £577 15s. for 1 month at 4 °/₀
= $\frac{1}{75}$ of $\frac{1}{12}$ of £577 15s.
= $\frac{1}{75}$ of £48 2s. 11d.
= £1 18s. $6\frac{1}{4}$d.;
$\therefore$ Sum = £480 + £607 + £577 15s.
+ £4 + £8 1s. $10\frac{2}{3}$d.
+ £1 18s. $6\frac{1}{4}$d.
= £1,678 15s. $4\frac{11}{12}$d. Ans.

Algebra.

1. D. W. (M. N.)—Sum to n terms the series whose mth term is 2×3^m. (*Todhunter's* 'Algebra for Beginners.')

Sum to n terms = $(2 \times 3) + (2 \times 3^2) + (2 \times 3^3) + \ldots + (2 \times 3^n)$
= $2(3 + 3^2 + 3^3 + \ldots + 3^n)$
= $2 \times \frac{3(3^n - 1)}{3 - 1}$ { sum of G. P. where $a = 3$ and $r = 3$
= $2 \times \frac{3(3^n - 1)}{2}$
= $3(3^n - 1)$. Ans.

Note.—Perhaps 80 per cent.

2. ALPHA.—Solve:—

$$\frac{3x}{x+2} - \frac{x-1}{6} = x - 9.$$

$$\frac{3x}{x+2} - \frac{x-1}{6} = x - 9$$
$$18x - (x-1)(x+2) = 6(x-9)(x+2)$$
$$18x - (x^2 + x - 2) = 6(x^2 - 7x - 18)$$
$$18x - x^2 - x + 2 = 6x^2 - 42x - 108$$
$$17x - x^2 - 6x^2 + 42x = -108 - 2$$
$$-7x^2 + 59x = -110$$
$$x^2 - \frac{59x}{7} = 15\frac{5}{7}$$
$$x^2 - \frac{59x}{7} + \left(\frac{29}{14}\right)^2 = \frac{3481}{196} + 15\frac{5}{7}$$
$$= \frac{3481 + 3080}{196}$$
$$= \frac{6561}{196}$$
$$x - \frac{29}{14} = \pm \frac{81}{14}$$
$$\therefore x = \pm \frac{81}{14} + \frac{29}{14}$$
$$= \frac{110}{14}, \text{ or } -\frac{52}{14}$$
$$= 10, \text{ or } -3\frac{1}{7}.$$

3. J. MACKLAND.—Solve:—

$$\frac{1}{x+a+b} = \frac{1}{x} + \frac{1}{a} + \frac{1}{b}. \quad (\textit{Moffatt's } \text{'4th Year Course.'})$$

$$\frac{1}{x+a+b} = \frac{1}{x} + \frac{1}{a} + \frac{1}{b}$$
$$abx = ab(x+a+b) + bx(x+a+b) + ax(x+a+b)$$
$$= abx + a^2b + ab^2 + bx^2 + abx + b^2x + ax^2 + a^2x + abx$$
$$ax^2 + bx^2 + a^2x + 2abx + b^2x = -a^2b - ab^2$$
$$(a+b)x^2 + (a+b)^2x = -ab(a+b)$$
$$x^2 + (a+b)x = -ab$$
$$x^2 + (a+b)x + \left(\frac{a+b}{2}\right)^2 = \frac{a^2 + 2ab + b^2}{4} - ab$$
$$= \frac{a^2 - 2ab + b^2}{4}$$
$$x + \frac{a+b}{2} = \pm \frac{a-b}{2}$$
$$\therefore x = \pm \frac{a-b}{2} - \frac{a+b}{2}$$
$$= -a, \text{ or } -b.$$

4. MARK TWAIN.—Solve:—

$$mx^2 - \frac{m^3 - n^3}{mn} x = 1. \quad (\textit{Colenso.})$$

$$mx^2 - \frac{m^3 - n^3}{mn} x = 1$$
$$x^2 - \frac{m^3 - n^3}{m^2 n} x = \frac{1}{m}$$
$$x^2 - \frac{m^3 - n^3}{m^2 n} x + \left(\frac{m^3 - n^3}{2m^2 n}\right)^2 = \frac{1}{m} + \frac{m^6 - 2m^3 n^3 + n^6}{4m^4 n^2}$$
$$= \frac{4m^3 n^3 + m^6 - 2m^3 n^3 + n^6}{4m^4 n^2}$$
$$= \frac{m^6 + 2m^3 n^3 + n^6}{4m^4 n^2}$$
$$x - \frac{m^3 - n^3}{2m^2 n} = \pm \frac{m^3 + n^3}{2m^2 n}$$
$$\therefore x = \pm \frac{m^3 + n^3}{2m^2 n} + \frac{m^3 - n^3}{2m^2 n}$$
$$= \frac{2m^3}{2m^2 n}, \text{ or } -\frac{2n^3}{2m^2 n}$$
$$= \frac{m}{n}, \text{ or } -\frac{n}{m}.$$

5. FOLKESTONIAN.—The sum of four numbers in Geometrical Progression is 200, and the first term is 5; find the ratio.

$$\text{Sum} = \frac{a(r^n - 1)}{r - 1};$$

$$\therefore\ 200 = \frac{5(r^4 - 1)}{r - 1}$$

$$40 = \frac{r^4 - 1}{r - 1}$$

$$= r^3 + r^2 + r + 1$$

$$r^3 + r^2 + r - 39 = 0$$

$$(r - 3)(r^2 + 4r + 13) = 0;$$

If, $r^2 + 4r + 13 = 0$

$$r^2 + 4r + 4 = -9$$

$$r + 2 = \pm\sqrt{-9};$$

This gives impossible values of r;

If, $r - 3 = 0$

$\therefore r = 3.$

$\therefore$ Ratio $= \underline{3}$.

6. DUNELM.—A perfectly flexible rope of uniform thickness is closely coiled upon a level floor. If the diameter of the rope be $2a$, show that the length of the first n complete coils will be $\pi a n (2n + 1)$;

Show also how to find the length of the $(n + 1)$th coil.

$$\text{First coil} = \frac{\pi}{2}(2a + 4a),$$

$$\text{Second ,,} = \frac{\pi}{2}(6a + 8a),$$

$$\text{Third ,,} = \frac{\pi}{2}(10a + 12a),$$

$$n\text{th ,,} = \frac{\pi}{2}\left\{4a\left(n - \tfrac{1}{2}\right) + 4an\right\};$$

$\therefore$ Length of first n complete coils

$$= \frac{\pi}{2}\left\{6a + 14a + 22a + \ldots + (8an - 2a)\right\}$$

$$= \frac{\pi}{2}\left\{6a + (8an - 2a)\right\} \times \frac{n}{2}$$

$$= \frac{\pi n}{4}(8an + 4a)$$

$$= \pi an(2n + 1).$$

Length of $(n + 1)$th coil

$$= \frac{\pi}{2}\left\{8a(n + 1) - 2a\right\}$$

$$= \pi a(4n + 3).$$

Mensuration.

1. CECIL.—The edge of a wedge is 2 feet 3 inches; the length of the base is 2 feet 9 inches, and the breadth is 8 inches; the height of the wedge is 14 inches; the wedge is divided into two pieces by a plane, which passes through a point in the edge, distant 18 inches from one end, and which is parallel to the triangular face at that end. Find the volume of each piece. *(Todhunter.)*

$$\text{Solidity of larger piece} = \left(\frac{\overset{4}{\cancel{8}} \times 14}{\underset{1}{\cancel{2}}} \times 18\right) \text{cub. in.}$$

$$= 1008 \text{ cub. in.};$$

Solidity of wedge = (Twice length of base + length of edge) $\times \frac{1}{6}$ breadth of base $\times$ height of wedge;

$\therefore$ Solidity of smaller piece

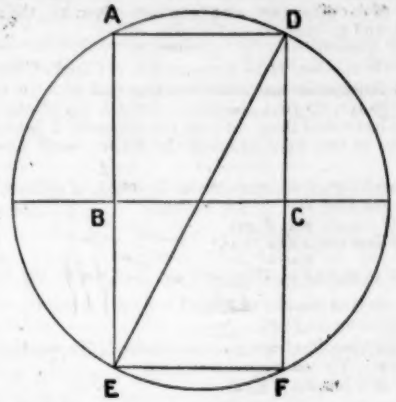
$$= \frac{\left\{2(33 - 18) + (27 - 18)\right\} \times \overset{4}{\cancel{8}} \times 14}{\underset{3}{\cancel{6}}} \text{ cub. in.}$$

$$= \frac{(30 + 9) \times 56}{3} \text{ cub. in.}$$

$$= \frac{\overset{13}{\cancel{39}} \times 56}{\underset{1}{\cancel{3}}} \text{ cub in.}$$

$$= \underline{728 \text{ cub. in.}} \quad \text{Ans.}$$

2. WARWICKSHIRE.—Find the side of a square inscribed in a semicircle, whose radius is 5 feet. (Pupil Teachers' Course—3rd Year.)



Let ABCD be the square inscribed in the semicircle.

If AB, DC, be produced to E, F, then BEFC is the square described in the other semicircle.

Because DAE is a right angle, DE passes through the centre, that is, is a diameter of the circle. (See Euclid III. 31.)

Now, $DE^2 = AE^2 + AD^2$ (I. 47)

$$(5 \times 2)^2 = (2\,AD)^2 + AD^2$$

$$10^2 = 4\,AD^2 + AD^2$$

$$100 = 5\,AD^2$$

$$\therefore\ AD^2 = 20$$

$$AD = \sqrt{20}$$

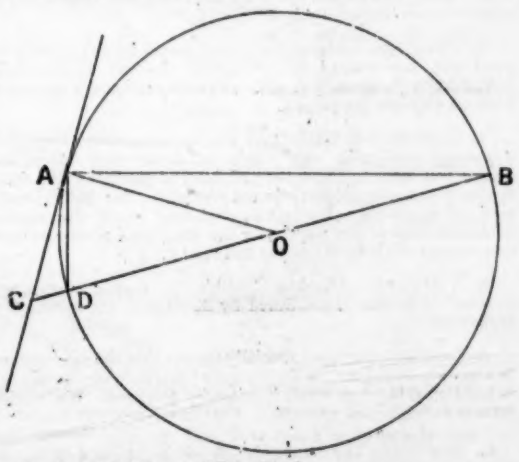
$$= \sqrt{4 \times 5}$$

$$= \underline{2\sqrt{5}}.$$

$\therefore$ Side of inscribed square $= \underline{2\sqrt{5}}$ feet. Ans.

Geometry.

1. PERPLEXUS.—The tangent drawn at one extremity A of a chord AB, less than the diameter, meets the produced diameter drawn through the other extremity in a point C, and the produced diameter cuts the circumference in D; prove that the angle BAC exceeds the angle ACB by three times the angle in the the segment standing on AD.



Proof.—$\angle OAB = \angle OBA$ (I. 5.)

$= \angle$ angle in segment standing on AD;

$\angle CAD =$,, ,, (III. 32.)

$\angle OAD = \angle ODA$ (I. 5.)

$= \angle ACD + \angle CAD$ (I. 32.)

$= \angle ACB +$ angle in segment standing on AD;

$\therefore\ \angle BAC = \angle ACB +$ 3 times angle in segment standing on AD. Q. E. D.

General.

1. HYDALGO.—If the square of the third number plus the product of the other two = 22 (you have given 19), the numbers are 2, 3, and 4.

2. NITOR.—No. 11 of Chapter XX. of Capel's Catch Questions in Arithmetic was evidently intended to be a converse question to No. 10 (but the prices became interchanged) and ought to have read thus, 'if with the proceeds I bought Five per Cents. at 120, &c.,' to which the answer would have been 108.

The working of the question as it stands at present, is thus given in the key.

My old income was £200,

∴ my new income is £225.

$\frac{225}{5}$ = 45 cents and these cost me £45 × 108 and 45 × 108 contains 50 (the number of cents I had) 97½ times.

∴ the price was £97½. Ans.

Had the Question been given as intended, the working would have been. My old income was £200.

∴ my new income is £225.

$\frac{225}{5}$ = 45 cents and these cost me £45 × 120, and 45 × 120 contains 50 (the number of cents I had) 108 times. ∴ the price was £108, and £108 is the element of the question as it originally stood, which was intended to be asked for in the converse question.

3. HANWY.—You don't mention any university in particular, we assume therefore that you mean the University of London. Write to the Registrar, Burlington Gardens, Piccadilly, he will send you the regulations for matriculation. You must pass that examination first.

4. SHARROW GROT.—The large hand is a little too upright, but in other respects it will do very well, 75. The small hand is a sort of large hand written small. The letters r, h, and m, are specially bad. The whole of the copy is much too upright. The marks for the separate subjects of the scholarship examination are not published. We cannot say how long it would require. That depends upon many things, but you might give half an hour a day to it. No book is named before-hand. Yes, we believe it will be made easier.

5. NIL DESPERANDUM.—Yes, by application in the usual way, just as though you intended to go on for two years. It does not follow that you would be accepted, nor would it in any other case. Health and character are taken into consideration as well as intellectual ability.

6. TUNSTALL.—Almost any edition would do, but a specially good one was noticed in our review columns in February published by Longmans & Co. For climate consult any good book on physical geography.

7. HAMLET.—It means that you are to be able to analyse a passage and parse the words involving any difficulties. Hence you want to know the principles of grammar and their applications to the subject selected for study. Buy Sully's handbook of psychology, Longmans, and read about the senses. A chapter such as you require for the other part of the subject may appear ere long where you can read it.

8. J. MILLER.—Hamblin Smith's or Lock's elementary treatise. The first is published by Rivington, the second by Macmillan.

9. J.—The department specially request that the information you ask for should not be made public; it is only communicated in confidence to those whom it primarily concerns. We cannot therefore oblige you.

10. MERTON.—The curves are all bad in the large hand, the letters are misshaped, nearly exactly the same must be said of the small hand, 50, 55. If you really want to write nicely, buy a set of copy books and practice ten minutes a day for three months, you will improve wonderfully in that time.

11. M.H.—Any good book on school management gives the sort of information required. Loudon's is a good book; the one you name treats of the subject, use them both. Be quite ready to give instructions how to keep registers and fill up forms.

12. W.K.R.—Candidates are not examined in Science. They are examined in Vocal Music but not in Instrumental.

13. A SUBSCRIBER.—We cannot tell you the number of marks but they are considerable. The percentage is easy to estimate, D 70, E 90. Large hand is too thick and upright; some of the strokes are not made with one stroke of the pen.

14. SARNIA.—*Pope's* 'Essay on Man,' by Mark Pattison, 1s. 6d.; 'Satires and Epistles,' 2s.; Selections from Papers in the Spectator, 4s. 6d. Clarendon Press; Chamber's *Pope's* 'Essay on Man' is annotated. For general criticism *Johnson's* 'Lives of the Poets' is good. For the mixed mathematics begin with *Garnet's* 'Dynamics' (Bell & Co.). Globe Edition of *Pope's* works, with Notes by Ward, Macmillan, 3s. 6d.

15. J. H. SLADDIN.—We think the first you name has ceased to appear: the second is published by the proprietors, 279, High Street, Edinburgh.

16. SCIENCE STUDENT.—You can get the questions for each year, price 6d. We are not aware that any book of answers is published of the kind you want.

17. A PUPIL TEACHER.—The pressure of the air outside is equal to that of a column of water 34 ft. high: that at a point of the inside of the top of the tube is that of a column (34−20) = 14 ft. high. Now a column of water 14 ft. high and one inch in cross section contains $14 \times \frac{1}{144}$ cubic feet of water $= \frac{14}{144} \times 62{\cdot}4 = 6{\cdot}06$ lbs., this weight is on a square inch ∴ pressure is 6·06 lbs. per square inch. As the pressure outside the top of the glass is about 15 lbs. per square inch, and 6·06 inside, if a hole be made in the glass the water will run down till it is on the same level as that on the general surface.

18. R. FISH.—If $\sin \alpha = \frac{1}{4}(\sqrt{6} - \sqrt{2})$, find the value of $\tan(45° + \alpha) + \tan(45° - \alpha)$. (*Atkins*)

$$\begin{aligned}
&\text{Tan}(45° + \alpha) + \tan(45° - \alpha) \\
&= \frac{\tan 45° + \tan \alpha}{1 - \tan 45° \tan \alpha} + \frac{\tan 45° - \tan \alpha}{1 + \tan 45° \tan \alpha} \\
&= \frac{1 + \tan \alpha}{1 - \tan \alpha} + \frac{1 - \tan \alpha}{1 + \tan \alpha} \\
&= \frac{2(1 + \tan^2 \alpha)}{1 - \tan^2 \alpha} \\
&= \frac{2\left(1 + \frac{\sin^2 \alpha}{\cos^2 \alpha}\right)}{1 - \frac{\sin^2 \alpha}{\cos^2 \alpha}} \\
&= \frac{2\left(1 + \frac{\sin^2 \alpha}{1 - \sin^2 \alpha}\right)}{1 - \frac{\sin^2 \alpha}{1 - \sin^2 \alpha}} \\
&= \frac{2}{1 - 2\sin^2 \alpha} \\
&= \frac{2}{1 - 2[\frac{1}{16}(\sqrt{6} - \sqrt{2})]^2} \\
&= \frac{2}{1 - 2[\frac{1}{64}(6 + 2 - 2\sqrt{12})]} \\
&= \frac{2}{1 - 2[\frac{1}{64}(8 - 4\sqrt{3})]} \\
&= \frac{2}{1 - 2[\frac{1}{16}(2 - \sqrt{3})]} \\
&= \frac{2}{1 - \frac{1}{8}(2 - \sqrt{3})} \\
&= \frac{16}{8 - 2 + \sqrt{3}} \\
&= \frac{16}{6 + \sqrt{3}} \\
&= \frac{16(6 - \sqrt{3})}{36 - 3} \\
&= \underline{\frac{16}{33}(6 - \sqrt{3})}. \quad \text{Ans.}
\end{aligned}$$

19. ONTARIO.—We have enquired carefully but can find no record of what you refer to. Any communication from you will receive attention. Difficulty does not account for delay.

20. M. P. I.—(1.) The fallacy follows from dividing each side by $a - b$. As this expression equals 0, the quotient in each case is infinity, and not a and $a + b$ respectively.

(2.) We believe your writing will obtain *full* marks. The only fault is in the capitals.

21. IXION.—You did not say what you really wanted.

KIND	SUBJECT	PREDICATE	OBJECT	EXTENSION	CONNECTIVE
(*a*) Principal	Their king, their lords, their mightiest They	melted	—	low (manner) from the field (place)	—
(*b*) Subord. Adverbial of Comparison to (*a*)	snow	dissolves	—	in silent dew (circumstance)	As
(*c*) Subord. Adverbial of Time to (*b*)	streams	are swollen	—	—	When
(*d*) Subord. Adverbial Cop. Co-ord. with (*c*)	south winds	blow	—	—	And

About Ourselves.

WITH this issue of our Journal we once again begin a new volume—our seventh. This, therefore, may not be an unfitting opportunity to take our readers into our confidence and tell them a few of the leading features of the PRACTICAL TEACHER for the coming year. We say '*few*' advisedly, for, with a boldness which neither does credit to head nor heart, some of our contemporaries have on previous occasions unhesitatingly annexed our programme and adopted it, almost in its entirety, as their own. This sincerest form of flattery, gratifying and profitable as it may prove to some people, is hardly in keeping with that golden rule which bids us 'do unto others as we would that they should do unto us.' Others, not content with *imitating* us, have with Yankee-like audacity—an audacity close akin to impudence, not to mention dishonesty—reprinted bodily some of the most popular contributions which have from time to time appeared in our Journal. We think the experience of the past twelve months will deter these polite gentry from paying us a similar compliment in the future.

***

EVERYONE interested in educational progress will be pleased to hear that Sir Philip Magnus, the able director of the City Guilds Institute, South Kensington, has kindly promised us a series of papers on 'Technical Education in Elementary Schools.' This subject ought to be of peculiar interest just now, especially in view of the fact that technical training in some form or other—if we are to believe those who *ought* to know—is certain to find a place in the coming radically-reformed Code.

***

A MEMBER of the Royal Commission on Education has promised occasional papers on topics of current interest, and in the present number there appears the first instalment of an Essay on 'How to Teach Geography in Elementary Schools,' the writer of which won the FIRST PRIZE awarded by the Scottish Geographical Society.

***

To the younger members of the profession we are delighted to announce that one of Her Majesty's Inspectors of Schools will contribute 'Monthly Hints and Helps for Pupil Teachers.' These papers will be most comprehensive, forming a complete guide to study, &c., and in connection therewith it is intended to hold 'Prize Competitions.'

***

WHAT may be termed the 'Examination Section' of the Journal will contain :—

(*a*) Recent Inspection Questions *in all Subjects*, with Model Answers.

(*b*) Model Answers to Pupil Teachers' Questions of both sexes.

(*c*) Model Answers to Scholarship Questions.

(*d*) Model Answers to Certificate Questions.

(*e*) Model Answers to the Matriculation Examination Questions of the London University.

In every instance the Answers will be prepared by men and women specially qualified for the work.

***

WE have made a special effort to assist Acting Teachers who cannot avail themselves of the advantages of a two years' course in a Training College, and who intend to take up the Second Year's papers at the ensuing Certificate Examination. To begin with, the *specific course in Geography*, as set forth in the new Syllabus, will be exhaustively treated by Mr. J. H. Cowham, one of the most able and expert teachers of the day. Students who read the lessons carefully will need *no other manual*, as Mr. Cowham's papers will be sufficiently comprehensive for the purposes of the Examination.

THE same remarks apply to Mr. Dawson's valuable notes on 'Hamlet.' By the way, our readers may expect in the course of the year 'How to Recite Hamlet,' by one of the most distinguished elocutionists living. Every Pupil Teacher in the Kingdom should read this play (though not prescribed for them) and try to profit by the Hints for Recitation.

***

As nearly every teacher of ability now 'takes up' language at the Certificate Examination, we have decided to print a juxtalinear translation of Lamartine's 'Christophe Colomb,' and Coppée's 'Le Luthier de Crémone.' This translation will be accompanied by notes, grammatical hints, &c., and will be done by Mr. Bower, than whom few men living have been more successful as teachers of the modern languages.

***

THE REV. A. D. CAPEL whose contributions have in the past been so highly valued, will write on The PRINCIPLES of Mental Arithmetic. These papers will be alike valuable to Pupil Teachers, Students and Acting Teachers.

***

OTHER features worthy of a passing note will be—'How to Knit Stockings, with Specially Prepared Maps,' 'How to teach a class to Sing from Notes,' 'How to teach Drill,' 'How my School was Examined,' 'Notes of Lessons for Young Pupil Teachers,' and the usual monthly Songs for Schools.

BEFORE bringing to a close this Gossip about ourselves we may perhaps be allowed to urge our Readers to avail themselves even more largely than ever of the advantages of our Query Column. It is simply impossible,—willing though we are to do all in our power to oblige our subscribers—to accede to *all* requests. Our pages would have to be quadrupled. But every query shall have our prompt and best attention. The questions addressed to us are not answered in haphazard fashion; they are invariably, whatever their nature may be, put into the hands of experts.

***

ONE word about our Reviews and we have done. The past year has brought us the average crop of praise and blame. Curious, and in some instances exceptionally amusing, have been the incidents connected with this section of our work. To the dissatisfied we simply say that we have done our duty; that during the six years the PRACTICAL TEACHER has been before the public, no review has ever been 'doctored'; and that many of the ripest scholars of the age have cheerfully served us in this department. As to the future we can only add, that so long as the hand which traces these lines controls the fortunes of this journal, fair play shall be meted out to all; and that if we cannot command success, we will do what is far better—try to *deserve* it.

Owing to pressure on our space several Queries and Reviews are held over.

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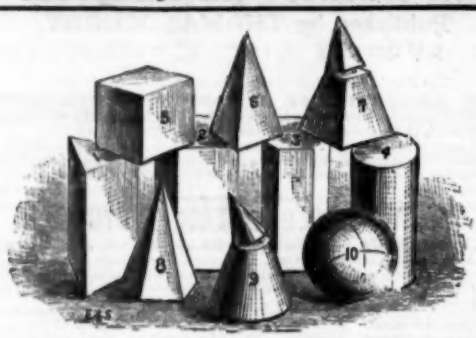

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